CITY OF CORONA

2020 URBAN WATER MANAGEMENT PLAN

VOLUME 1 – DRAFT REPORT

June 2021

Prepared by

Michael Baker INTERNATIONAL

CITY OF CORONA

2020 URBAN WATER MANAGEMENT PLAN

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PREPARED FOR

CITY OF CORONA
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UNDER THE SUPERVISION OF

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[1] Under separate cover: City of Corona 2020 Urban Water Management Plan Volume 2 – Appendices

Executive Summary

Overview and Plan Preparation

This executive summary provides an overview of the content included in the City of Corona's (City) 2020 Urban Water Management Plan (UWMP). This report was prepared in compliance with the California Water Code as set forth in the 2020 Urban Water Management Plans Guidebook for Urban Water Suppliers (referred to hereafter as Guidebook) established by the Department of Water Resources (DWR).

Preparation of an Urban Water Management Plan (UWMP) is required by the California Department of Water Resources (DWR) for all urban water suppliers within the State of California. Urban water suppliers are defined as publicly or privately owned water suppliers that provide water for municipal purposed either directly or indirectly to more than 3,000 customers or supply more than 3,000 acre-feet (AF) of water annually. UWMPs must meet requirements established in the California Water Code and the Urban Water Management Planning Act.

This UWMP is organized as directed by DWR in the Guidebook including chapter topics and content, delineation of mandatory statutes, and standardized Water Use Efficiency (WUE) tables. Description and analysis are specific to the Water Service Area which encompasses approximately 39 square miles including the City and portions of unincorporated Riverside County within the City's sphere of influence.

Purpose

This Urban Water Management Plan serves multiple purposes.

At the state level, data associated with current and projected supply and demand conditions inform policy-makers of pending issues that may be addressed through legislation, regulation and allocation of resources.

At the regional level, coordination between adjacent and interdependent agencies assure consistency in projection and allocation of resources to support anticipated growth trends.

At the City level, documentation included in the UWMP is essential for the preparation of Water Supply Assessments and Water Supply Verifications to assist the City as the lead agency in evaluating and approving specific plans, environmental impact reports, construction permits for new development, and adoption of Tentative Tract Maps.

At the system level, the UWMP is a composite of data and information concerning the integration of potable water, recycled water, wastewater, groundwater, and surface water systems. This data and information is considered important for efficient operation and management of local water resources in terms of supply availability, reliability and sustainability.

System Water Use

Water use within the Water Service Area consists primarily of single family residential, multi-family residential, commercial/industrial/institutional (CII), landscaping and sales to two neighboring water systems: City of Norco and Home Gardens County Water District. Projected water use is anticipated to stabilize over then 20 years as the City approaches build-out.

Compliance with Water Conservation Target

In accordance with the Water Conservation Act of 2009 (aka SB X7-7), the City had previously calculated in the 2015 UWMP its baseline water use and its target for a 20% reduction in per capita water use by 2020 in terms of gallons per capita per day (GPCD). The City baseline per capita water use is 262 GPCD. The City's 2020 target per capita water use is 213 GPCD. The City achieved a per capita water use of 177 GPCD in 2020. The City is compliant with the requirements of the Water Conservation Act.

System Supplies

The City has a diverse water supply portfolio including imported water from Western Municipal Water District (WMWD), groundwater from two local basins (Temescal Basin and Bedford-Coldwater Basin), and reclaimed water for landscape irrigation and other non-potable uses.

Water Supply Reliability

Water supply reliability was assessed for normal years, single dry years, and five consecutive dry years projected through 2045. This means that projected supply was compared to projected demand under normal and drought conditions to verify adequacy of supply. All of the City's sources of supply are sustainably managed and are projected to exceed demand through 2045.

In addition, a drought risk assessment was conducted to verify adequacy of supply under an immediate five consecutive year drought. The City has sufficient supply reliability to meet demand under these conditions.

Water Shortage Contingency Planning

The City has enacted water conservation ordinances in order to provide guidance and authority for responding to water shortages.

Demand Management Measures

Demand management measures (aka water conservation best management practices) refer to water conservation projects and programs implemented by the City to reduce water use or water loss. In coordination with WMWD, the City maintains a robust water conservation program. Consistent implementation of the water conservation program over the last ten years is largely responsible for the City achieving its water use efficiency goals.

Review and Adoption

A public hearing was held June 16, 2016 to solicit comments on the UWMP Draft. Two weeks prior to the public hearing, the UWMP Draft was made available for public review and key stakeholders were notified directly of the opportunity to comment on the UWMP Draft. No comments were received from stakeholders or the public. Immediately following the public hearing, the UWMP was adopted unanimously by the City Council.

Chapter 1 – Introduction and Overview

In this introductory chapter, the importance and extent of the City's water management planning efforts is discussed.

1.1 – Purpose

> *Water Code Section 10608.12*
>
> *(p) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.*
>
> *(r) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.*

The California Water Code requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (AF) of water annually to prepare and adopt an Urban Water Management Plan (UWMP) for submission to the Department of Water Resources (DWR) every five years.

1.2 – UWMP Organization

To facilitate review by DWR, the 2020 UWMP is organized according to the Guidebook, as follows:

- **Executive Summary** – This section provides the newly required lay description.
- **Chapter 1 – UWMP Introduction.** This chapter provides a discussion on fundamentals of the UWMP.
- **Chapter 2 – Plan Preparation.** This chapter provides information on the processes used for developing the UWMP, including efforts in coordination and outreach.
- **Chapter 3 – System Description.** This chapter provides a description of the existing system include maps of the service area and its regional context, an explanation of the service area, its climate and demographics.
- **Chapter 4 – Customer Water Use.** This chapter describes and quantifies the current and projected water uses within the water service area.
- **Chapter 5 – Conservation Target Compliance.** This chapter provides achievement of the City water use efficiency goals as determined in the 2015 UWMP per compliance with the Water Conservation Act of 2009 (aka SB X7-7).
- **Chapter 6 – System Supplies.** This chapter describes and quantifies the current and projected supplies available to the City.
- **Chapter 7 – Water System Reliability.** This chapter reconciles projected supply and demand through 2045 under normal year, single dry year and five consecutive dry year conditions. In addition, this chapter includes the City's Drought Risk Assessment.

- **Chapter 8 – Water Shortage Contingency Planning.** This chapter provides a structured plan for dealing with water shortages.
- **Chapter 9 – Demand Management Measures.** This chapter details the City's effort to improve water use efficiency through the implementation of a water conservation program.
- **Chapter 10 – Plan Adoption, Submittal, and Implementation.** This chapter details to actions taken to demonstrate compliance with the Water Code.

  Appendices – Mandatory and informational materials are provided in this section to facilitate use of the UWMP as a reference document for development planning, grant applications, water conservation opportunities, and similar water supply topics.

1.3 – UWMPs in Relation to Other Efforts

To the extent feasible, the 2020 UWMP is consistent with other planning efforts involving the City and its stakeholders. The subsections that follow describe current planning documents consulted and referenced herein.

1.3.1 – Urban Water Management Planning and the California Water Code

Following is a summary of the legislation that makes up Urban Water Management Planning:

- AB 1420: Requires implementation of demand management measures (DMMs)/best management practices (BMPs) to qualify for water management grants or loans.
- AB 1465: Requires water suppliers to describe opportunities related to reclaimed water use and stormwater recapture to offset potable water use.
- SB 6101, and SB 2212, which became effective beginning January 1, 2002, requires counties and cities to consider information relating to the availability of water to supply new large developments by mandating the preparation of further water supply planning and Water Supply Assessments.
- SB 1087: Requires water suppliers to report single family residential (SFR) and multi-family residential (MFR) projected water use for planned lower income units separately.
- SB 3185 requires the UWMP to describe the opportunities for development of desalinated water, including but not limited to, ocean water, brackish water, and groundwater, as long-term supply.
- AB 1056 requires urban water suppliers to submit their UWMPs to the California State Library.
- SB X7-7: Requires development and use of new methodologies for reporting population growth estimates, base per capita use, and water conservation, and requires meeting the developed water conservation targets in order to qualify for water management grants and loans. This water bill also extended the 2010 UWMP adoption deadline for retail agencies to July 1, 2011.
- SB 1478: This bill was signed on September 23, 2010 and extends the 2010 UWMP deadline for wholesale agencies, such as the Metropolitan Water District of Southern California (MWDSC), to July 1, 2011, as SBx7-7 did for retail agencies.
- AB 1668 and SB 606: These laws, enacted in 2018, lay out a new long-term water conservation framework for California to pick where SB X7-7 left off.

1.3.2 – Master Plans

The 2020 UWMP is being prepared concurrently with the City's Potable Water Master Plan. These documents share certain common features that must be consistent for planning and management purposes such population analysis, demand analysis, supply analysis, water quality as a constraint on supply availability, supply portfolio management, identification of facilities, and demographic analysis.

The 2018 Reclaimed Water Master Plan is referenced in the 2020 UWMP concerning future expansion of recycled water use.

1.3.3 – General Plan

The City's General Plan and Specific Plans are referenced in terms of identifying the locations, nature and limitations of anticipated growth.

1.3.4 – Regional Context

The 2020 UWMP was prepared in coordination with the WMWD, WRCWRA, the Temescal GSA, and the Bedford-Coldwater GSA. These agencies oversee key aspects of the City's water supply portfolio.

1.3.5 – Other Relevant Documents

The City's AWIA Risk and Resiliency Assessment was referenced as it relates to seismic vulnerability.

The City's Climate Action Plan was referenced as it relates to anticipated impacts of climate change on water sustainability.

1.4 – UWMPs and Grant or Loan Eligibility

> *Water Code Section 10608.56*
>
> *(a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.*
>
> *(c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.*
>
> *(e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.*
>
> *(f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).*
>
> *Water Code Section 10656*
>
> *An urban water supplier is not eligible for a water grant or loan awarded or administered by the state unless the urban water supplier complies with this part. California Code of Regulations Section 596.1 (b)(2) "disadvantaged community" means a community with a median household income that is less than 80 percent of the statewide annual median household income.*

By virtue of preparing, adopting and submitting a 2020 UWMP to the state by the July 1, 2021 deadline, the City will continue to be eligible for water grants and loans administered by DWR and other state funding mechanisms as determined by their administering agencies.

1.5 – Demonstration of Consistency with the Delta Plan for Participants in Covered Actions

The City does not anticipate participating in covered actions related to policy concerning the Delta Plan such as a multi-year water transfers, conveyance facilities, or new diversions that involve transferring or using water in the Delta.

Chapter 2 – Plan Preparation

This chapter provides information on the processes used for developing the UWMP, including efforts in coordination and outreach.

2.1 – General Description

Plan Preparation deals with protocols and documentation for notifications, inter-agency coordination, publication and adoption. Adoption of the UWMP implies subsequent implementation by the adopting agency, and Plan Preparation drills down to the details of the adopting agency's implementation strategy.

2.2 – Basis for Preparing a Plan

> *Water Code Section 10617*
>
> *"Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems.*
>
> *Water Code Section 10620*
>
> *Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.*
>
> *Water Code Section 10621*
>
> *(a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.*

The City provides municipal water service to more than 3,000 customers and in excess of 3,000 AFY. This defines the City as an urban water supplier. Therefore, the City has prepared this Urban Water Management Plan update in compliance with CWC 10621(d).

2.2.1 – Public Water Systems

Water Code Section 10644

(a)(2) The plan, or amendments to the plan, submitted to the department … shall include any standardized forms, tables, or displays specified by the department.

California Health and Safety Code 116275

(h) "Public Water System" means a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year.

The City's water service area is designated as Public Water System 3310037.

2.2.2 – Suppliers Serving Multiple Service Areas/Public Water Systems

The City provides wholesale water service on a contract basis to Home Gardens County Water District (Public Water System CA3310018).

2.3 – Regional Planning

The City is not part of a regional plan or regional alliance.

2.4 – Individual or Regional Planning and Compliance

The City is submitting as an individual water retailer.

2.5 – Annual Reporting Basis and Units of Measure

Water Code Section 10608.20

(a)(1) Urban retail water suppliers…may determine the targets on a fiscal year or calendar year basis.

Water supply and demand are reported on a calendar year basis in units of acre-feet per year (AFY).

2.6 – Coordination and Outreach

Water Code Section 10631

(j) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (c). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (c).

Water Code Section 10620

(d)(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

Water Code Section 10642

Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan...

The following agencies were contacted directly regarding the opportunity to comment on the UWMP Draft:

- Riverside County
- City of Riverside
- City of Norco
- Bedford-Coldwater Sustainable Groundwater Sustainability Agency
- Temescal Valley Water District
- Elsinore Valley Municipal Water District
- Western Municipal Water District
- Orange County Sanitation District
- Home Gardens County Water District
- General Public

2.7 – Notice to Cities and Counties

Water Code Section 10621

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

Riverside County was notified pursuant to Water Code Section 10621.

Chapter 3 – System Description

This chapter provides for demonstrating a deep understanding of the service area including the physical boundary, the associated current and projected population, and demographic and weather-related influences.

3.1 – Service Area Description

Water Code Section 10631.

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

The subsections that follow provide a detailed description of the City's water service area in terms of location, vicinity, weather, population and demographics.

3.2 – Location

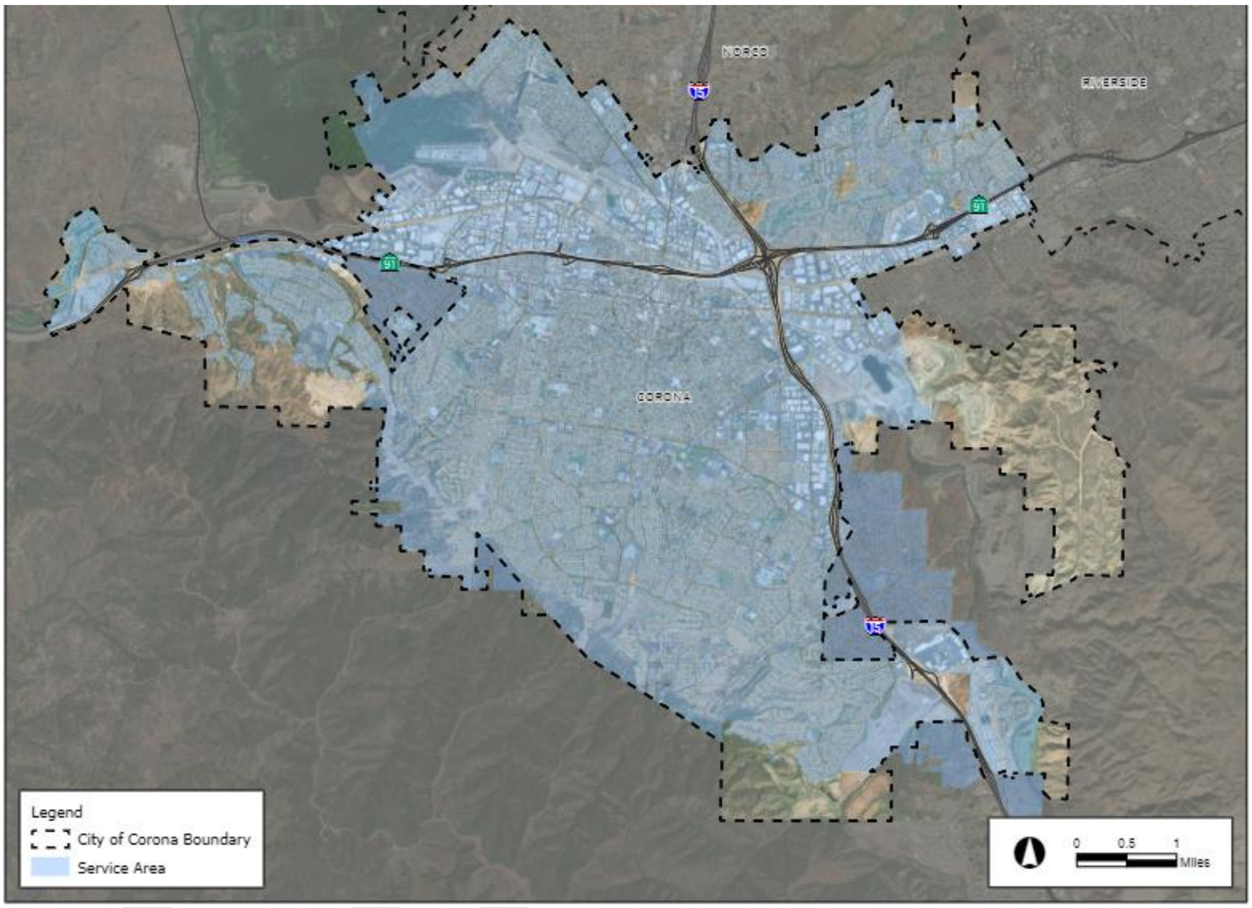
The City's water service area is located in the northwestern portion of Riverside County (County) and includes the unincorporated communities of El Cerrito, Coronita, and parts of Temescal Canyon. The City's water service area encompasses approximately 39 square miles. Neighboring cities include Riverside to the northeast and Norco to the north. The eastern portion of the service area is generally bounded by the unincorporated County including the unincorporated community of Home Gardens. The southern and western portions of the service area are bounded by the Cleveland National Forest and other County lands. Prado Flood Control Basin is located adjacent the City's northwest corner.

The area is divided by two primary Southern California highways, providing access into the City from all directions. The Riverside Freeway (CA-91) runs east and west and the Corona Freeway (I-15) runs north and south through the City. Major local roads include Lincoln Avenue, Main Street, and Fullerton Avenue in the north-south direction; and Ontario Avenue, Sixth Street and Railroad Street in the east-west direction.

3.3 – Service Area Boundary Maps

The water service area encompasses approximately 39 square miles within the incorporated boundary of the City of Corona and extending into several adjacent areas as shown in Figure 3.1.

Figure 3.1 – Water Service Area Boundary Map



3.4 – Service Area Climate

Water Code Section 10631(a)

A plan shall… Describe the service area of the supplier, including … climate…/block text

Water Code Section 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning… while accounting for impacts of climate change.

Climate data were acquired from the UC Riverside CIMIS Weather Station Number 44[2]. This is the closest continuously monitored weather station to the City.

The climate in the City is Mediterranean. Temperatures are generally mild in the winter and moderately high in the summer. There are approximately 329 days of sunshine per year. Most rain is received in the winter and early spring months resulting in dry and hot summers. Table 3.1 provides a summary of historical average evapotranspiration index, precipitation and temperature.

Table 3.1 – 10-year Average Climate Statistics

Month	Average Precipitation (inches)	Average Evapotranspiration Index (inches)	Average Daily High Temperature (°F)	Average Daily Low Temperature (°F)
January	1.32	2.57	67.9	45.0
February	1.27	3.15	68.5	44.8
March	0.83	4.59	71.9	48.4
April	0.31	5.80	75.8	51.6
May	0.27	6.15	77.5	54.7
June	0.01	6.97	85.9	59.3
July	0.17	7.06	91.2	63.8
August	0.10	7.15	93.2	64.7
September	0.12	5.59	89.9	62.5
October	0.36	4.10	82.5	56.3
November	0.59	2.77	73.6	49.2
December	1.19	2.05	66.3	44.1
Annual	6.54	57.95	78.7	53.7

[2] http://ipm.ucanr.edu/calludt.cgi/WXSTATIONDATA?STN=UC_RIVER.A (Accessed March 23, 2021)

3.5 – Service Area Population

Water Code Section 10631(a)

Describe the service area of the supplier, including current and projected population …The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

The historical, current and projected population within the water service area is provided in Table 3.2.

Table 3.2 - Population

Year	Population
1990	85,774
1995	101,078
2000	134,902
2005	143,876
2010	160,188
2015	167,764
2020	170,100
2025	172,900
2030	176,100
2035	179,600
2040	182,800
2045	185,600

Population was estimated using multiple sources.

- The DWR Population Tool was used to determine the historical and current population. Projected population was calculated as follows:
- Riverside County[3] provides population estimates for all of its cities, projected on a 5-year basis through 2035. Since the water service area does not coincide with the City's boundary, the County's population projection for the City was scaled relative to the 2015 population calculation generated by the DWR Population Tool.
- The City plans to transfer 126 existing single family residential customers to the Temescal Valley Water District. Per the US Census[4] , there are 3.24 persons per household within the County. This will reduce the population by an estimated 410 starting in 2020.
- The population in 2040 and 2045 was determined by linear extrapolation based on estimates for 2020, 2025, 2030 and 2035.

3.6 – Other Social, Economic, and Demographic Factors

Water Code Section 10631

(a) Describe the service area of the supplier, including… other social, economic and demographic factors affecting the supplier's water management planning.

The Water Service Area is over 90% built-out. No large changes in demographics are anticipated. Water demand is expected to stabilize under these conditions.

[3] County of Riverside, Transportation and Land Management Agency (Site accessed March 22, 2021) https://rctlma.org/Portals/0/rcd/content/progress_reports/pr_2010/11_corona.pdf

[4] United Stated Census Bureau. (Site accessed May 5, 2016) http://www.census.gov/quickfacts/table/PST045215/06065

3.7 – Land Uses within Service Area

Water Code Section 10631(a)

The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities…

The City's Water Service Area includes the City of Corona and portions of unincorporated Riverside County. For consistency in reporting on land use for these two jurisdictions, the Southern California Association of Governments (SCAG) Land Use Database was used. SCAG periodically updates land use data for research and analytical purposes; the most recent update was in 2016. Table 3.3 provides a summary of SCAG 2016 Land Use within the City of Corona Water Service Area.

Table 3.3 – Land Use Summary

SCAG LU16 Code	Description	Number of Parcels	Area (acres)
1110	Single Family Residential	30,647	7,477.91
1100	Residential	1	0.22
1111	High Density Single Family Residential (9 or more DUs/ac)	1,283	309.47
1112	Medium Density Single Family Residential (3-8 DUs/ac)	867	543.24
1120	Multi-Family Residential	1,532	730.36
1123	Low-Rise Apartments, Condominiums, and Townhouses	5	3.41
1130	Mobile Homes and Trailer Parks	283	170.8
1131	Trailer Parks and Mobile Home Courts, High-Density	4	3.95
1150	Rural Residential	29	71.92
1200	Commercial and Services	868	1,037.91
1210	General Office Use	92	189.86
1220	Retail Stores and Commercial Services	18	13.95
1223	Retail Strip Development	44	29.94
1230	Other Commercial	1	2.19
1232	Commercial Recreation	1	0.48
1240	Public Facilities	68	126.51
1243	Fire Stations	1	0.36
1244	Major Medical Health Care Facilities	1	0.55
1245	Religious Facilities	72	166.89
1246	Other Public Facilities	2	0.49
1260	Educational Institutions	55	472.64
1263	Junior or Intermediate High Schools	1	13.09

SCAG LU16 Code	Description	Number of Parcels	Area (acres)
1300	Industrial	923	1,891.79
1310	Light Industrial	2	0.62
1311	Manufacturing, Assembly, and Industrial Services	44	43.3
1320	Heavy Industrial	5	1.93
1321	Manufacturing	2	2.09
1323	Open Storage	3	4.26
1330	Extraction	13	353.91
1331	Mineral Extraction - Other Than Oil and Gas	2	36.94
1340	Wholesaling and Warehousing	1	1.77
1410	Transportation	160	176.74
1411	Airports	1	702.34
1412	Railroads	26	127.29
1413	Freeways and Major Roads	2	10.03
1415	Bus Terminals and Yards	2	1.37
1416	Truck Terminals	5	7.62
1420	Communication Facilities	1	1.17
1430	Utility Facilities	37	60.29
1437	Improved Flood Waterways and Structures	223	829.88
1440	Maintenance Yards	3	8.62
1500	Mixed Commercial and Industrial	2	2.23
1700	Under Construction	51	393.7
1800	Open Space and Recreation	175	1,669.15
1810	Golf Courses	57	733.06
1820	Local Parks and Recreation	1	117.07
1830	Regional Parks and Recreation	10	769.98
1880	Other Open Space and Recreation	7	23.21
2000	Agriculture	20	192.84
2110	Irrigated Cropland and Improved Pasture Land	2	12.64
2200	Orchards and Vineyards	2	11.83
2300	Nurseries	12	17.31
2600	Other Agriculture	4	10.55
3000	Vacant	514	1,590.04
3100	Vacant Undifferentiated	194	2,218.36
3300	Vacant With Limited Improvements	20	33.6
RW	Right-of-Way	1,091	4,065.66
Totals		**39,492**	**27,489.33**

Chapter 4 – Customer Water Use

4.1 – General Description

Customer water use involves organizing and reducing historical water demand data into pre-determined categories and timeframes. Standardized methodologies are employed to calculate a historical baseline for purposes of demonstrating achievement of water use reduction goals.

4.2 – Non-Potable Versus Potable Water Use

The City delivers potable water and non-potable water to its customers. Potable water consists of treated groundwater from the Temescal and Bedford-Coldwater Basins, imported treated water from WMWD and imported raw water from WMWD which the City treats at the Lester water Treatment Facility and the Sierra del Oro Water Treatment facility. Non-potable water consists of reclaimed tertiary treated wastewater from the City’s three Water Reclamation Facilities and non-potable groundwater from the Bedford-Coldwater Basin. In addition, the City will begin to receive reclaimed water from the Western Riverside County Regional Wastewater Authority upon completion of a transmission pipeline that is currently under construction. This chapter deals primarily with potable water. Non-potable water is discussed in much greater detail in Chapter 6.

4.3 – Past, Current, and Projected Water Use by Sector

Water Code Section 10635.

(a*) Every urban water Supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

Water Code Section 10631(d)

(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…

(2). The water use projections shall be in the same five-year increments described in subdivision (a).

(4)(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections. (ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

4.3.1 – Water Use Sectors Listed in Water Code

Water Code Section 10631(d)

(1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

The City tracks water sales by the following sectors:

- Residential Single Family
- Residential Multi Family
- Commercial/Institutional
- Industrial
- Landscape
- Hydrants (street cleaning, sewer flushing, construction)

The City provides wholesale water service to Home Garden County Water District.

The City provides water to the City of Norco.

The City discharges brine waste from the Temescal Desalter to the Inland Empire Brine Line (IEBL).

Water loss is the difference between water production and the sum of water sales and brine discharge. The City makes annual Water Audits to further differentiate types of water loss. Note that the Water Audits are reported on a fiscal year basis.

4.3.2 – Past Water Use

Table 4.1 provides a summary of water sales for the last five years.

Table 4.1 – Summary of Past Water Use

Sector	2016 (AFY)	2017 (AFY)	2018 (AFY)	2019 (AFY)	2020 (AFY)
Residential Single Family	17,468	18,072	19,143	17,569	19,450
Residential Multi Family	2,291	2,368	2,454	2,394	2,674
Commercial/ Institutional	3,196	3,242	3,211	3,022	2,944
Industrial	995	1,031	1,099	1,007	1,005
Landscape	2,913	3,112	3,351	2,886	3,226
Hydrants	328	107	314	163	159
Sales to Other Agencies	525	380	396	553	429
Brine Discharge	1,670	1,712	1,734	1,771	1,625
Real & Apparent Losses	1,572	2,602	1,762	1,773	2,729
Total Water Use	30,958	32,626	33,464	31,138	34,241

4.3.3 – Distribution System Water Loss

> *Water Code Section 10631(d)(1)*
>
> *For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following…*
>
> *(J) Distribution system water loss….*
>
> *Water Code Section 10631(d)(3)*
>
> (A*) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34*
>
> *(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.*
>
> *(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.*

Table 4.2 provides a summary of water losses per Water Audits for the last five years. The complete Water Audits are provided in Appendix K.

Table 4.2 – Summary of Water Losses

Type	FY 2015-16 (AFY)	FY 2016-17 (AFY)	FY 2017-18 (AFY)	FY 2018-19 (AFY)	FY 2019-20 (AFY)
Apparent Loss	45	690	762	696	733
Real Loss	859	1,144	520	723	375
Total Loss	904	1,834	1,282	1,419	1,108

4.3.4 – Current and Projected Water Use

Water Code Section 10635 (a).

Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

Water Code Section 10631

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available… The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

Water Code Section 10631(d)(4)

(A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

Table 4.3 provides a summary of current and projected water use through 2045.

Table 4.3 – Summary of Current and Projected Water Use

Sector	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Residential Single Family	19,450	18,839	18,996	19,180	19,327	19,427
Residential Multi Family	2,674	2,523	2,544	2,569	2,589	2,602
Commercial/ Institutional	2,944	3,078	3,104	3,134	3,158	3,174
Industrial	1,005	1,044	1,053	1,063	1,071	1,077
Landscape	3,226	2,876	2,526	2,176	1,826	1,476
Hydrants	159	200	200	200	200	200
Sales to Other Agencies	429	200	200	200	200	200
Brine Discharge	1,625	2,000	2,000	2,000	2,000	2,000
Real & Apparent Losses	2,729	2,000	2,000	2,000	2,000	2,000
Total Water Use	34,241	32,760	32,623	32,522	32,371	32,156

Current water use is the actual demand from 2020.

Projected water use for residential, commercial, institutional, industrial and landscape customers starts with a baseline of the average use for 2018, 2019 and 2020 and is then adjusted as follows:

- Residential, commercial, institutional and industrial water use increases proportionally to population growth
- Residential, commercial, institutional and industrial water use decreases annually at a rate of 0.2% as an elastic response to anticipated wholesale cost increases and installation of more efficient water fixtures per Ordinance No. 2962.
- Landscape water use decreases by 350 AFY every five years as the reclaimed water system expands and converts potable water customers to reclaimed water.

Hydrants, Sales to Other Agencies, Brine Discharge, and Real & Apparent Losses are anticipated to be static.

4.4 – Water Use for Lower Income Households

Water Code Section 10631.1.

(a*) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.*

California Health and Safety Code Section 50079.5 (a)

"Lower income households" means persons and families whose income does not exceed the qualifying limits for lower income families… In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

Below are statistics related to household income in the City.

Income

$34,370
Per capita income

about 20 percent higher than the amount in the Riverside-San Bernardino-Ontario, CA Metro Area: $28,763

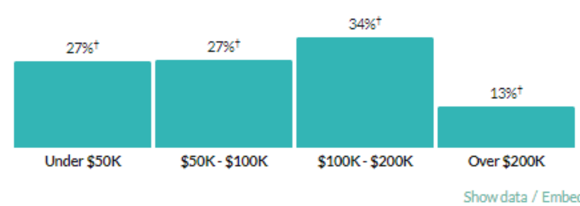
about 90 percent of the amount in California: $39,393

$86,790
Median household income

about 25 percent higher than the amount in the Riverside-San Bernardino-Ontario, CA Metro Area: $70,954

about 10 percent higher than the amount in California: $80,440

Household income



Household income (Table B19001) View table

Column	Corona				Riverside-San Bernardino-Ontario, CA Metro Area				California			
Under $50K	26.6%†	±3.4%	12,734	±1,717.2	35.1%	±0.9%	484,296	±13,101.4	31.7%	±0.3%	4,167,825	±34,680.6
$50K - $100K	26.8%†	±3.7%	12,828	±1,834.4	31.5%	±0.9%	434,031	±11,928.2	27.8%	±0.2%	3,661,397	±32,290.4
$100K - $200K	33.8%†	±3.7%	16,165	±1,897.8	26.1%	±0.7%	359,597	±9,966.5	26.8%	±0.2%	3,525,910	±31,856.1
Over $200K	12.7%†	±2.5%	6,066	±1,206	7.4%	±0.4%	101,782	±5,305	13.7%	±0.1%	1,802,741	±18,330

Hide data

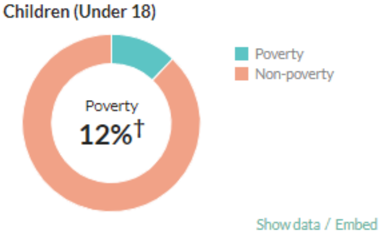
Poverty

8.7%
Persons below poverty line

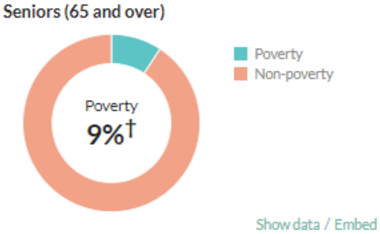
about two-thirds of the rate in the Riverside-San Bernardino-Ontario, CA Metro Area: 12.2%

about three-quarters of the rate in California: 11.8%

Children (Under 18)



Seniors (65 and over)



https://censusreporter.org/profiles/16000US0616350-corona-ca/

Based in the preceding data, 37% of households are have an income lower than 80% of the median for the region. These are classified as lower income. The demand associated with these households is provided in Table 4.4.

Table 4.4 – Projected Lower Income Water Use

Household Type	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Residential Single Family	6,970	7,029	7,097	7,151	7,188
Residential Multi Family	934	941	951	958	963

4.5 – Climate Change Considerations

Water Code Section 10630.

It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

Water Code Section 10635(b)

Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following…

Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) Drop down list (y/n)

If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc… utilized in demand projections are found.

Are Lower Income Residential Demands Included In Projections? Drop down list (y/n)

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections

NOTES:

DRAFT

Water Use Characterization

UWMP 2020 Draft 4-39

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

4.5.1 – Local Considerations

The City updated its Climate Action Plan[5] (CAP) in 2019. The CAP identifies energy used for water production, treatment and transmission as a contributor to greenhouse gas (GHG) emissions and recommends water conservation to reduce the impact. Reduced water use will also assist in managing water availability, which may be impacted by the frequency and intensity of droughts and increased temperatures. Impacts to water availability are not quantified in the CAP.

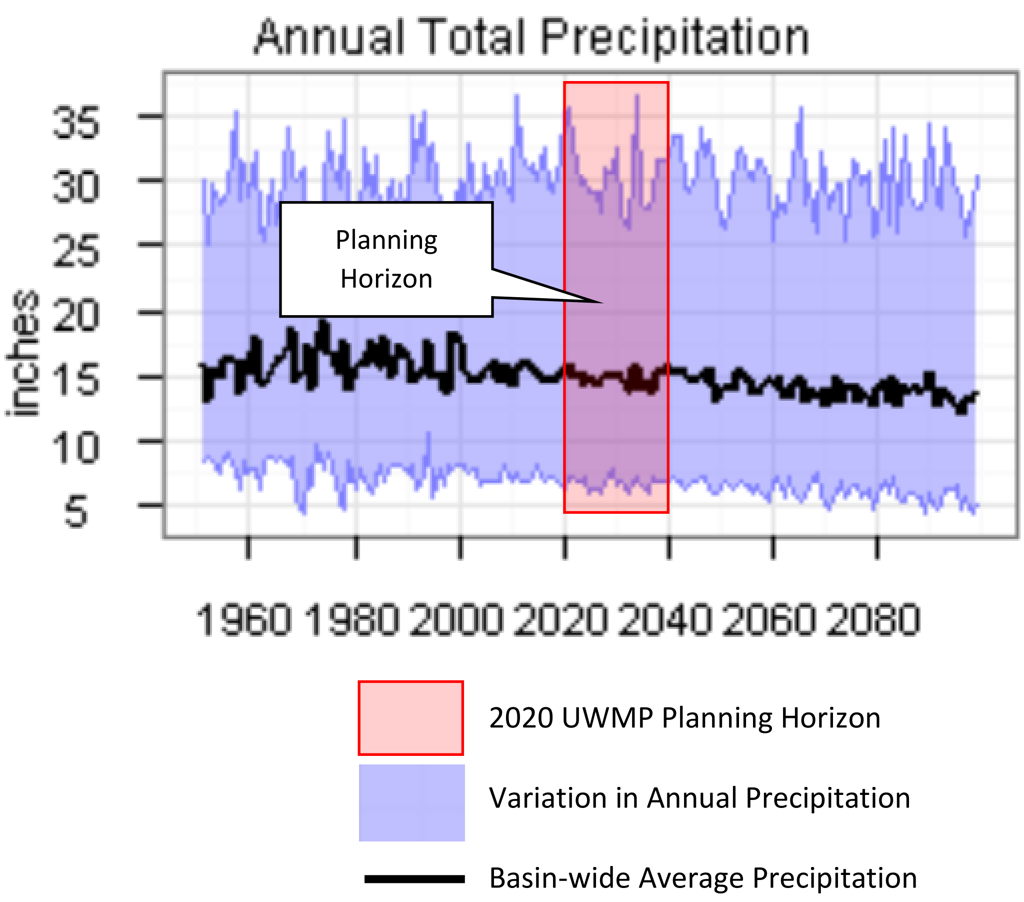
[5] City of Corona Climate Action Plan Update. (March 2019). Site accessed April 15, 2021. https://www.coronaca.gov/home/showpublisheddocument?id=18422

To those ends, the City has adopted California's Green Building Standard Code and has exceeded the 2020 water use efficiency goals established by SB X7-7 through an aggressive and continuing water conservation program.

4.5.2 – Regional Considerations

The City relies on groundwater for up to 50% of its potable water supply. The Temescal Basin is recharged by natural and artificial means. The City discharges reclaimed water to percolation ponds overlying the Temescal Basin. The availability of reclaimed water for percolation is anticipated to increase with population growth. Natural recharge is dependent on precipitation within the Santa Ana Watershed. Per the 2013 Climate Change Analysis for the Santa Ana Watershed[6] (page 32), total precipitation for the region is anticipated to be stable over the planning horizon as shown in Figure 4.1.

Figure 4.1 – Projected Regional Precipitation

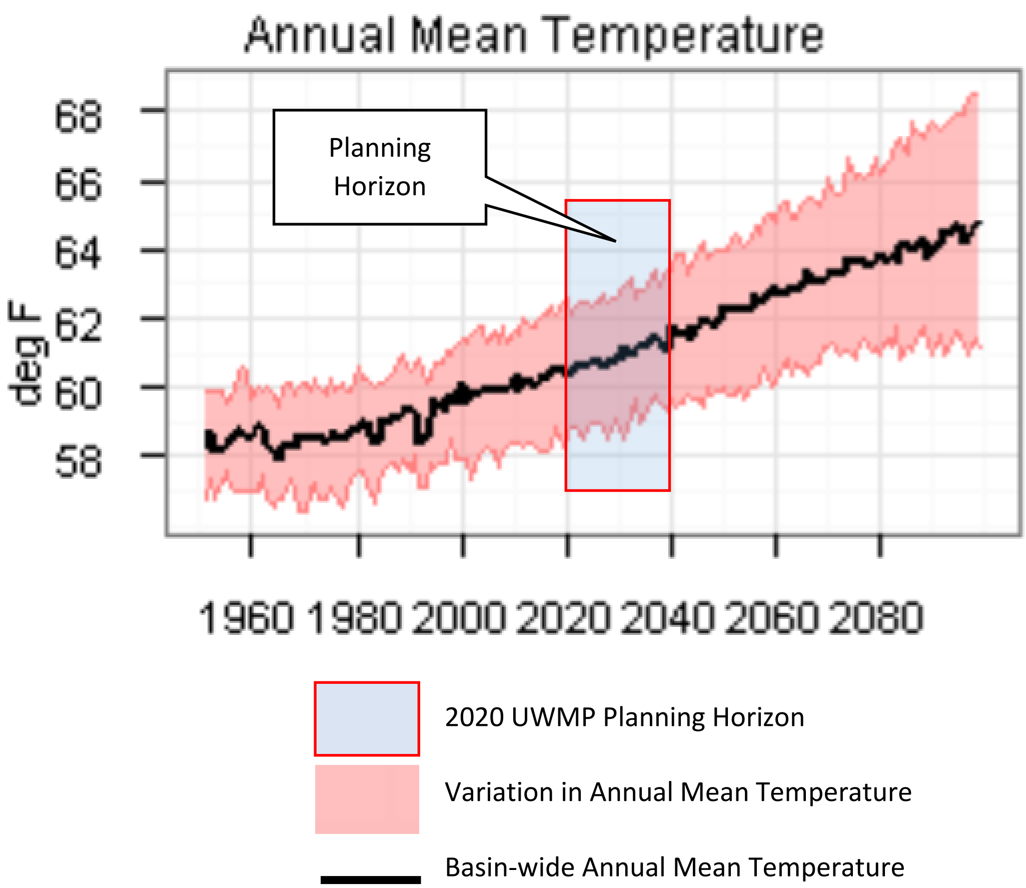


Climate change is not anticipated to impact groundwater availability in the Temescal Basin during the planning horizon.

[6] Bureau of Reclamation. (2014). *Climate Change Analysis for the Santa Ana Watershed*. TM 1 Climate Change.pdf (usbr.gov)

A significant portion of the City's water demand is dedicated to landscape irrigation. Irrigation demand tends to correlate with temperature. Per the 2013 Climate Change Analysis for the Santa Ana Watershed[7] (page 32), the annual mean temperature for the region is anticipated to increase by approximately one degree Fahrenheit over the planning horizon as shown in Figure 4.2.

Figure 4.2 – Projected Regional Mean Temperature



Climate change is anticipated to increase demand for landscape irrigation. In response to this increase in demand, the City is dedicated to converting potable water demand for landscape irrigation to reclaimed water at a rate of 350 AFY every five years.

[7] Bureau of Reclamation. (2014). *Climate Change Analysis for the Santa Ana Watershed*. TM 1 Climate Change.pdf (usbr.gov)

4.5.3 – Wholesaler Considerations

Per the WMWD 2020 Draft UWMP (see Appendix J):

(pp. 3-10 et seq.)

As part of this UWMP, Western considered the impacts of climate change on future water supplies and demands and water supply reliability. There are several studies that evaluate the potential impacts of climate change within the Western Wholesale and Retail areas.

Santa Ana Watershed Basin Study

SAWPA and the United States Bureau of Reclamation (USBR) completed the Santa Ana Watershed Basin Study (Basin Study) in 2013 as a complementary study to SAWPA's Integrated Regional Water Management planning process for the Santa Ana Watershed. As part of the Basin Study, USBR prepared a Climate Change Analysis for the Santa Ana River Watershed, included as Appendix E. The analysis evaluated frequently asked questions reading impacts to climate change on the Santa Ana River Watershed. The key findings most relevant to Western's water supply reliability are (U.S Department of the Interior Bureau of Reclamation, August 2013):

- *Annual surface water is likely to decrease over future periods;*
- *Precipitation shows somewhat long-term decreasing trends;*
- *Temperature will increase, which is likely to cause increased water demand and reservoir evaporation;*
- *More precipitation will fall as rain instead of snow;*
- *Projected decreases in precipitation and increases in temperature will decrease natural recharge throughout the basin;*
- *Management actions such as reducing municipal and industrial water demands or increasing recharge will be required to maintain current groundwater levels.*

  Metropolitan 2020 UWMP

  In their Draft 2020 UWMP, Metropolitan addresses the uncertainties of climate change on water supply planning, identifying several areas of concern:

- *Reduction in Sierra Nevada snowpack;*
- *Increased intensity and frequency of extreme weather events;*
- *Prolonged drought periods;*
- *Water quality issues associated with increase in wildfires;*
- *Changes in runoff pattern and amount; and*

- *Rising sea levels resulting in:*
    - *Impacts to coastal groundwater basins due to seawater intrusion;*
    - *Increased risk of damage from storms, high-tide events, and the erosion of levees; and*
    - *Potential pumping cutbacks on the SWP*

Hydrologic variability, potential climate change, and regulatory risk are embedded in Metropolitan's modeling efforts. Metropolitan's modeling utilizes historical hydrologic conditions from 1992 to 2017 to simulate expected demands on Metropolitan supplies, as well as capacities and constraints of its storage facilities and supply program. The Water Reliability Assessment and the Drought Risk Assessment in Metropolitan's Draft 2020 UWMP demonstrates that Metropolitan is able to mitigate the challenges posed by hydrologic variability, potential climate change, and regulatory risk on its imported supply sources through the significant storage capabilities it has developed over the last two decades, both dry-year and emergency storage (Metropolitan Water District of Southern California, 2021).

Metropolitan's 2020 IRP, which is currently under development, is further addressing ways to account for and mitigate the uncertainties associated with climate change.

Western Drought Contingency Plan – Climate Change Vulnerability Assessment

As part of the DCP that is currently being developed, a Climate Change Vulnerability Assessment (CCVA) for the Western service area was prepared to improve the understanding of climate change impacts on future water demand and local water supplies within Western's wholesale service area during normal and drought periods (GEI Consultants, April 2021). The CCVA technical memorandum provides details on the climate model data sources, climate analysis approach, calculation of the various supply and demand change factors. The complete CCVA is provided in Appendix F.

DWR has developed statewide climate change datasets to for use in the water resource planning that depict climate conditions in California under historical and future climate conditions. The DWR climate data used in the CCVA was assembled from 20 global climate models, to best represent anticipated climate conditions in California. The CCVA analysis was based on the median projected change from the majority of the selected climate models. DWR's California specific data is broken down into grid cells that are approximately 1/16th degree (approximately 3.75 miles) for the entire state. Each grid cell contains monthly time series based on 1915 to 2011 used to forecast future precipitation and evapotranspiration (ET) under 2030 and 2070 climate conditions.

Based on the timeseries data, climate change factors pertaining to supply and demand for normal, single dry, and 5-year dry periods were determined. The change factors represent the ratio of a simulated future value to the corresponding simulated historical value. The time series for precipitation and corresponding change factor can be used to estimate changes in supply while the time series for evapotranspiration and corresponding change factor can be used to estimate changes in demand. The results of the CCVA show:

- *Decreases in water supplies from the Santa Ana and Santa Margarita River basins under normal and drought conditions*
- *Decreases in precipitation and increases in surface water evaporation resulting from increased temperatures*
- *Smaller decreases in precipitation and natural groundwater recharge under normal and multi-year drought conditions. Results for a single-dry year anticipate slightly wetter future conditions compared to the 2020 baseline*
- *Precipitation will occur during shorter rainy seasons at a higher intensity*
- *Increases in outdoor water use under normal and drought conditions resulting from increased temperatures and higher ET rates*

Western is proactively planning to adapt to and mitigate the effects of climate change. Western is involved in various efforts to recharge local groundwater basins, which will help mitigate the effects of expected declines in natural groundwater recharge. Western also has an industry leading conservation program to promote water use efficiency across its wholesale and retail service areas. Western will continue to prioritize actions to adapt to and mitigate climate change to minimize impacts to supply reliability therefore, the climate change factors developed in the CCVA were not applied directly to the supply and demand projections in this UWMP.

As part of the ongoing DCP development, Western plans to analyze the extreme climate scenarios developed by DWR to characterize the range of potential impacts of climate change for the purposes of developing drought response and mitigation measures for the DCP, which will be completed in 2022.

Climate change can also impact water resources indirectly. For example, wildfire hazards are projected to increase in southern California with climate change. Wildfires can impact water resources by increasing water requirements for firefighting, changing surface vegetation and runoff patterns in burn areas, causing debris flows, and increasing siltation of reservoirs and hydraulic structures.

Chapter 5 – Conservation Target Compliance

This chapter involves demonstrating implementation of the California Water Conservation Act of 2009.

5.1 – General Description

The following subsections re-iterate the City's 2020 water use reduction goals as calculated in the 2015 UWMP, and the final subsection demonstrates achievement of those goals.

5.2 – Updating Calculations from 2010 UWMP

> *Water Code Section 10608.20 (g)*
>
> *(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).*

The City opted to update its water use target, since superior data and calculating tools were available for the 2015 cycle.

5.3 Baseline Periods

The data sources used for updating the water use target include historical public water system statistics issued to DWR and output from the DWR Population Tool.

5.3.1 – Determining Baseline GPCD

Per CWC 10608.12(b)(2), the City may not extend the baseline per capita water use calculation to a 15-year period because records indicate that the 10% reclaimed water use threshold was not achieved in 2008. In 2008, gross water use was 45,265 AF and reclaimed water use was 4,363 AF. Reclaimed water accounted for 8.9% of measured retail water demand in 2008.

As a result, the baseline per capita water use calculation must be the average of a continuous 10-year period drawn from the data set shown in

Year	Gross Water Use (AFY)	Population	Days	Annual Per Capita Water Use (GPCD)	10-year Average Per Capita Water Use (GPCD)
1995	26,402	101,078	365	233	
1996	30,416	104,104	366	260	
1997	32,770	111,679	365	262	
1998	31,022	120,499	365	230	
1999	38,133	128,617	365	265	
2000	39,705	134,902	366	262	
2001	39,012	135,634	365	257	
2002	43,436	140,179	365	277	
2003	43,131	142,818	365	270	
2004	43,228	143,348	366	268	258
2005	42,771	143,876	365	265	262
2006	44,834	154,403	365	259	262
2007	46,788	157,997	365	264	262
2008	45,265	158,003	366	255	264
2009	43,351	157,998	365	245	262
2010	39,185	160,188	365	218	258

The reference baseline per capita water use is dependent on the preferred method for calculating the 2020 water use target, as discussed in Section 5.6.

5.3.2 – Determining Target Confirmation

> *CWC 10608.12 (b)*
>
> *(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.*

The 5-year average per capita water for determining confirmation is calculated at 265 GPCD, as shown in Table 5.1.

Table 5.1 – Calculation of 5-year Target

Year	Gross Water Use (AFY)	Population	Days	Per Capita Water Use (GPCD)
2003	43,131	142,818	365	270
2004	43,228	143,348	366	268
2005	42,771	143,876	365	265
2006	44,834	154,403	365	259
2007	46,788	157,997	365	264
			5-year Period Average GPCD	265

The maximum allowable 2020 water use target is 95% of the 5-year average, or 252 GPCD.

5.4 – Service Area Population

Water Code Section 10608.20

(e) An urban retail water supplier shall include in its urban water management plan due in 2010…the baseline per capita water use…along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

Water Code Section 10644

(a)(2) The plan…shall include any standardized forms, tables or displays specified by the department.

For purposes of calculating baseline per capita water use, the DWR Population Tool was utilized. Input for the population tool includes the historical service area boundary in 1990, 2000 and 2010, and the total number of residential accounts from 1990 to 2010. Output is the population for each year within the service area boundary.

5.4.1 – Historical Service Area Boundary

Per the 2015 UWMP, the service area was identical in Census year's 1990, 2000 and 2010, (see 2015 UWMP Exhibit 3).

5.4.2 – Historical Total Residential Accounts

Per the 2015 UWMP, the total number of single family and multi-family residential connections for 1990 through 2010 were calculated as input for the population tool. This data set was incomplete for the following years: 1990- 1995, 2003 and 2007.

For 2003 and 2007, the number of connections was interpolated as the average of the preceding and succeeding years' totals.

For 1990, the number of connections was calculated proportionally to the average of the ratios of accounts and population for 2000 and 2010.

For 1991 through 1995, a straight-line increase in the number of connections between 1990 and 1996 was applied.

Refer to the 2015 UWMP for additional detail on account calculations.

5.4.3 – DWR Population Tool Results

Per the 2015 UWMP, the DWR Population Tool produced the results shown in Table 5.2.

Table 5.2 – Population for Determining Per Capita Water Use

Year	Census Population	Number of Connections	Persons Per Connection	Service Area Population
1990	85,774	20,263	4.23	85,774
1991		21,017	4.22	88,817
1992		21,830	4.21	91,906
1993		22,614	4.20	94,979
1994		23,398	4.19	98,036
1995		24,181	4.18	101,078
1996		14,965	4.17	104,104
1997		26,846	4.16	111,679
1998		29,036	4.15	120,499
1999		31,067	4.14	128,617
2000	134,902	32,675	4.13	134,902
2001		33,600	4.15	135,634
2002		34,061	4.17	140,179
2003		34,017	4.19	142,818
2004		33,973	4.21	143,348
2005		36,279	4.23	143,876
2006		36,941	4.26	154,403
2007		36,762	4.28	157,997
2008		36,582	4.30	158,003
2009		36,815	4.32	157,998
2010	160,188	36,884	4.34	160,188

5.5 – Gross Water Use

Water Code Section 10608.12

(g) "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier

(2) The net volume of water that the urban retail water supplier places into long term storage

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

California Code of Regulations Title 23 Division 2 Chapter 5.1 Article

Section 596 (a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

Per CWC 106808.12, gross water use was calculated for 1990 through 2010, as shown in

Table 5.3 – Gross Water Use

Year	Gross Water Use (AFY)
1990	25,992
1991	22,123
1992	22,861
1993	23,624
1994	25,621
1995	26,402
1996	30,416
1997	32,770
1998	31,022
1999	38,133
2000	39,705
2001	39,012
2002	43,436
2003	43,131
2004	43,228
2005	42,771
2006	44,834
2007	46,788
2008	45,265
2009	43,351
2010	39,185

5.6 – Baselines and Targets Summary

All applicable methods for calculating baseline and target water were reviewed. At 213 GPCD, Method 4 provides the greatest advantage to the City and has been adopted as the preferred method.

Target Method 4 involves a series of calculations based on a 10-year average per capita water use taken from Table 5.1, and water deliveries for the fifth year of the 10-year average. The following application is based on data associated with the 10-year period ending in 2007 and the methodology provided in DWR's Provisional Method 4 For Determining Water Use Targets (February 2011).

Step 1. Baseline Water Use and Midpoint Year

Baseline Per Capita Water Use for 10-year period ending in 2007 (see): 262 GPCD

CII Water use for midpoint year (2002): 59 GPCD

Average CII Water Use for 10-year period ending in 2007: 46 GPCD

Step 2. Metering Savings

All City accounts are metered. There are no savings associated with metering.

Step 3. Indoor Residential Savings

Alternative 2 (Default): Indoor Residential Savings is 15 GPCD. Step 4. CII Savings (Equation 5)

Step 4. CII Savings (Equation 5)

$$\boxed{\text{CII Savings, GPCD}} = \boxed{\text{Average Baseline CII Water Use, GPCD}} \times \boxed{0.10}$$

$$CII\ Savings = (0.10)(46\ GPCD) \cong 5\ GPCD$$

Step 5. Landscape Irrigation and Water Loss Savings (Equations 2 and 6)

$$\boxed{\text{Landscape Irrigation and Water Loss Sector Use}} = \boxed{\text{Baseline Per Capita Water Use}} - \boxed{\text{Standard Indoor Residential Use}} - \boxed{\text{CII Water Use in 2004}}$$

$$Landscape\ Irrigation\ and\ Water\ Loss\ Sector\ Use = 262 - 70 - 59 = 133\ GPCD$$

$$\boxed{\text{Landscape Irrigation and Water Loss Savings}} = \boxed{\text{Landscape Irrigation and Water Loss Sector Use}} \times \boxed{0.216}$$

$$Landscape\ Irrigation\ and\ Water\ Loss\ Savings = (133)(0.216) \cong 29\ GPCD$$

Step 6. Total Savings (Equation 3)

$$\boxed{\text{Total Savings}} = \boxed{\text{Metering Savings}} + \boxed{\text{Standard Indoor Residential Savings}} + \boxed{\text{CII Savings}} + \boxed{\text{Landscape Irrigation and Water Loss Savings}}$$

$$Total\ Savings = 0 + 15 + 5 + 29 = 49\ GPCD$$

Step 7. 2020 Water Use Target (Equation 1)

$$\boxed{\text{2020 Water Use Target}} = \boxed{\text{Baseline Per Capita Water Use}} - \boxed{\text{Total Savings}}$$

$$2020\ Water\ Use\ Target = 262 - 49 = 213\ GPCD$$

5.7 – 2020 Compliance Daily Per-Capita Water Use (GPCD)

Water Code Section 10608.12

(e) "Compliance daily per-capita water use" means the gross water use during the final year of the reporting period…

Water Code Section 10608.20

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 . . . compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

Per CWC 10608.20(g), the City updated the 2020 water use target using Method 4 as outlined in Section 5.6.4. The updated baseline water use and 2020 water use target are summarized in Table 5.4.

Table 5.4 – Baseline and Target Water Use

Water Use	GPCD
Baseline	262
2020 Target	213

The City actual 2020 gross water use is shown in Table 5.5.

Table 5.5 – Actual 2020 Water Use

Water Use (AFY)	Population	GPCD
33,815	170,100	177

The City has achieved its 2020 water use target and is in compliance with SB X7-7.

Chapter 6 – System Supplies

6.1 – General Description

System Supplies involve organizing and reducing historical water supply source data into predetermined categories and discussing the availability and sustainability of each source. Documentation on rights, adjudications, agreements, and opportunities for current and projected sources are required.

6.2 – Water Supply Analysis Overview

Water Code Section 10631(b)

Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier [in five-year increments to 20 years or as far as data is available]1 providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

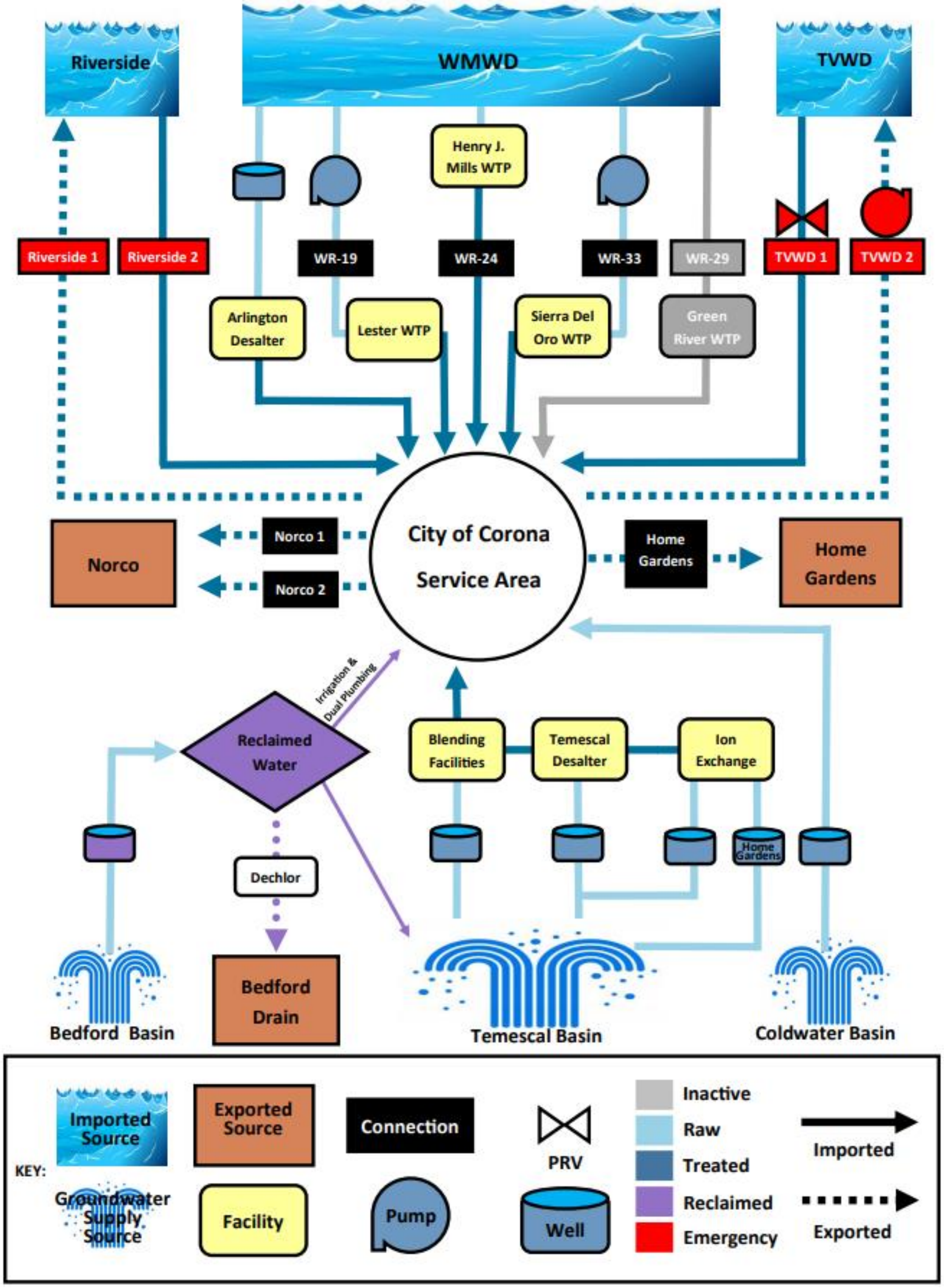
(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

Water Code Section 10631 (h)

An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

The City has a diversified water supply portfolio including imported water, groundwater, and reclaimed water. The schematic in Figure 6.1 shows the various sources and facilities described in this chapter.

Figure 6.1 – Water Supply Schematic



6.3 – Purchased or Imported Water

6.3.1 – Imported Water from WMWD

The City's primary sources of imported water are supplied through WMWD, a member agency of Metropolitan. WMWD has multiple sources at its disposal. The City's imported water supply from WMWD consists of treated surface water, untreated surface water, and desalinated brackish groundwater. Table 6.1 provides a summary of existing and projected supply from all WMWD sources. Projected imported water supply is consistent with WMWD Resolution 3166 which specifies "MWD full service water to be delivered at Tier 1 rates" for each of its member agencies as of 2022. See Appendix V for the Resolution.

Table 6.1 – Summary of WMWD Imported Water Supply

Year	2020	2025	2030	2035	2040	2045
Imported Water (AFY)	18,005	21,110	21,110	21,110	21,110	21,110

6.3.1.1 – WMWD Treated Surface Water

WMWD supplies treated surface water via the Mills Pipeline from Henry J. Mills filtration plant.

The Mills Pipeline delivers treated water directly to the City through metered turnout WR-24. This connection has an effective capacity of 6.5 MGD.

6.3.1.2 – WMWD Untreated Surface Water

WMWD supplies untreated surface water via the Lower Feeder.

The Lower Feeder supplies raw water to the City's Lester Water Treatment Plant through metered turnout WR-19 and to the City's Sierra del Oro Water Treatment Plant through metered turnout WR-33. The Lester Plant has a peak capacity of 30 MGD, and the Sierra del Oro Plant has a peak capacity of 9.0 MGD.

The Lower Feeder is connected to the City's Green River Water Treatment Plant via WR-29; however, this facility is currently inactive.

6.3.1.3 – WMWD Desalinated Brackish Groundwater

WMWD supplies desalinated brackish groundwater via the Arlington Desalter.

Supply from the Arlington Desalter primarily serves the cities of Norco and Riverside with excess production made available to the City of Corona.

6.3.2 – Other Imported Water

The City of Corona maintains connections with the City of Riverside and Temescal Valley Water District (TVWD), and has historically purchased water from these two sources.

6.4 – Groundwater

Water Code Section 10631(b)(4)

If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

The City has access to groundwater from two basins: the Temescal Basin and the Bedford-Coldwater Basin. The subsections that follow describe the physical characteristics, management, overdraft condition and pumping for each basin.

6.4.1 – Basin Description

Information contained in this subsection was taken from the following sources:

- Bulletin 118 (DWR, 2004) – Appendix F
- Corona 2008 Groundwater Management Plan – Appendix G
- Corona 2013 Recharge Master Plan for the Temescal Basin
- Bedford-Coldwater Groundwater Sustainability Plan – Appendix T

6.4.1.1 – Temescal Basin Description

The Temescal Basin is designated by DWR as the Upper Santa Ana Valley Groundwater Basin, Temescal Subbasin and recorded as Groundwater Basin Number 8-2.09, covering a surface area of 23,500 acres. Per Bulletin 118:

> ***Basin Boundaries and Hydrology***
>
> *The Temescal Subbasin underlies the southwest part of upper Santa Ana Valley. On the north, the subbasin is bounded by the Chino Subbasin, marked by the Santa Ana River and a set of low hills of crystalline rock near Norco. The eastern part of the subbasin is bounded by nonwater-bearing crystalline rocks of the El Sobrante de San Jacinto and La Sierra Hills. The subbasin is bounded on the west by the Santa Ana Mountains and the south by the Elsinore Groundwater Basin at a constriction in the alluvium of Temescal Wash. Average annual precipitation ranges from 14 to 16 inches per year.*
>
> ***Hydrogeologic Information: Water Bearing Formations***
>
> *The water-bearing materials are dominantly composed of Holocene age alluvium deposited by streams draining the northeast slopes of the Santa Ana Mountains. The Santa Ana River has from time to time contributed deposits through the Arlington Gap along the northern margin of the subbasin.*
>
> *The specific yield varies from about 6 percent along the southwestern and southern margins of the subbasin to about 13 percent beneath the Santa Ana River and more than 14 percent beneath Temescal Wash near Corona.*
>
> ***Restrictive Structures***
>
> *The Elsinore fault zone lies along the western boundary of the subbasin, and the Chino fault zone crosses the northwestern tip of the subbasin. These fault zones are possible groundwater barriers.*
>
> ***Recharge Areas***
>
> *Dominant recharge to the groundwater reservoir is from percolation of precipitation on the valley floor and infiltration of stream flow within tributaries exiting the surrounding mountains and hills.*
>
> ***Groundwater Level Trends***
>
> *Groundwater flows toward the center of the subbasin and then northeast toward the Santa Ana River.*

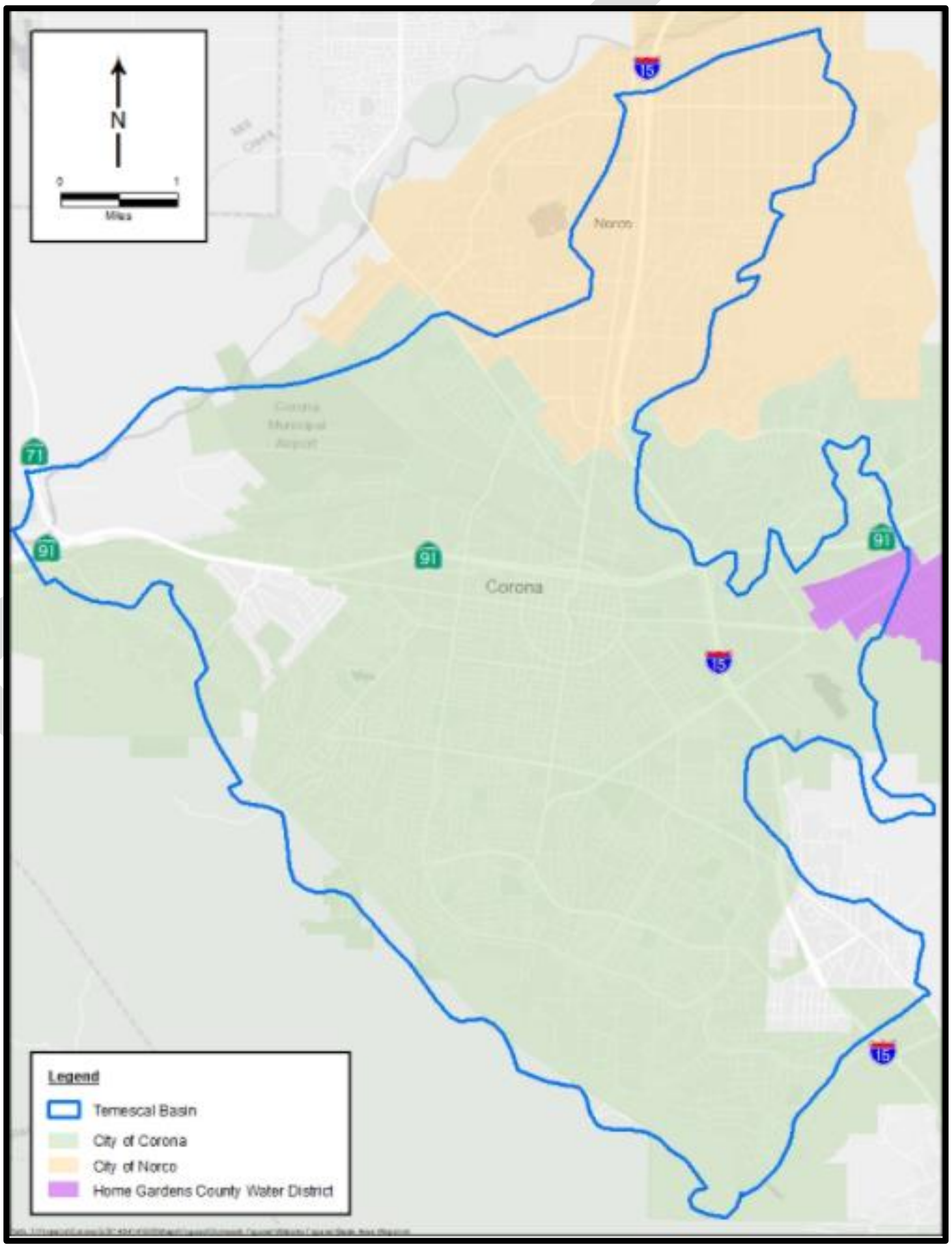
Groundwater Quality

Characterization. Water within the subbasin is predominantly calcium-sodium bicarbonate and has an average TDS content of 790 mg/L. Water from 20 public supply wells in the subbasin has an average TDS content of 753 mg/L and a range or 373 to 950 mg/L.

The 2008 Groundwater Management Plan (GWMP) provides detailed descriptions of the Temescal Basin's physical extent, contributing watershed, hydrology, water balance and geology (see Appendix G).

Figure 6.2 shows the Temescal Basin boundary.

Figure 6.2 – Temescal Basin



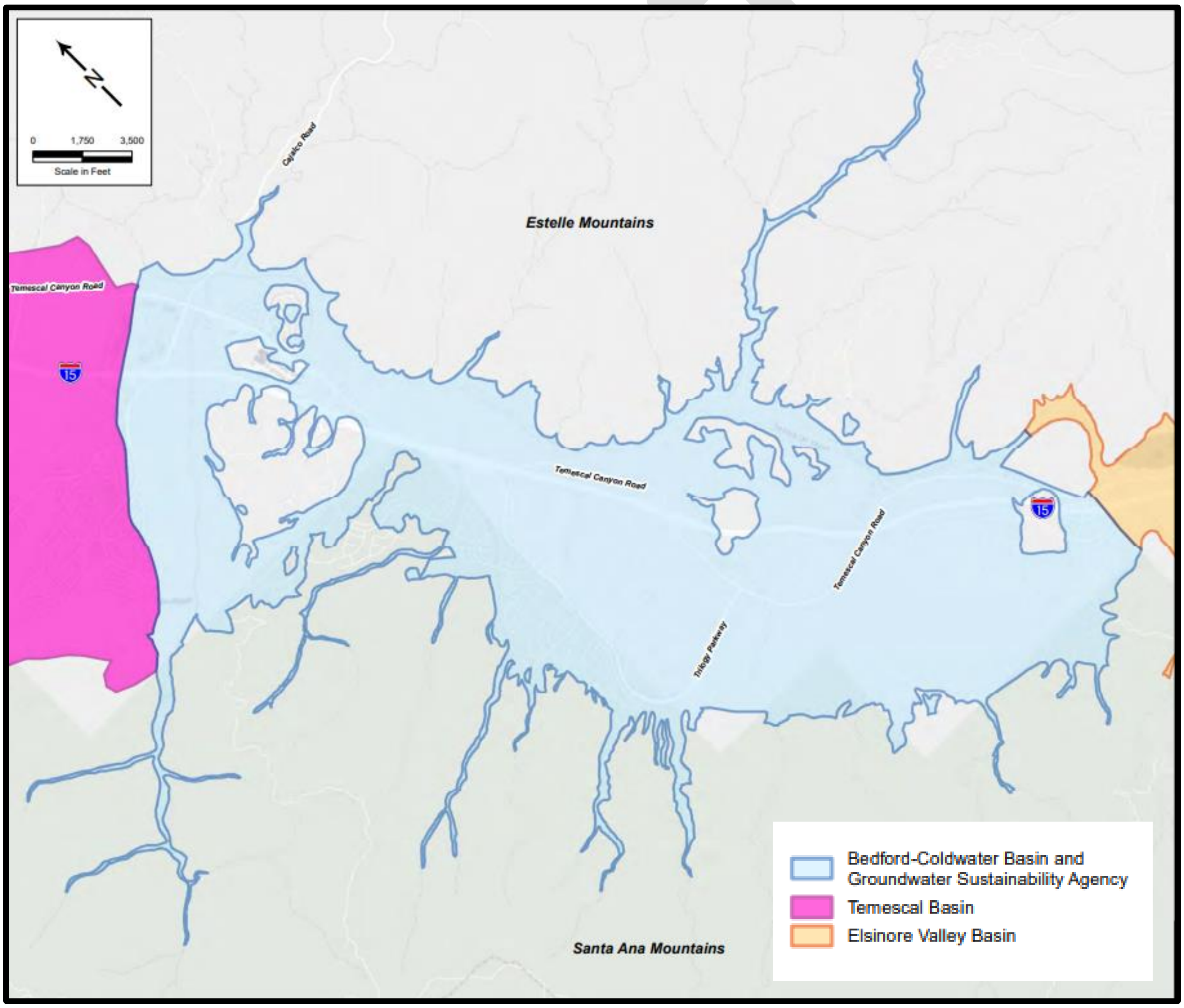
6.4.1.2 – Bedford-Coldwater Basin Description

The Bedford-Coldwater Basin is located south of the Temescal Basin in Temescal Canyon between the Santa Ana Mountains and the El Sobrante Hills generally underlying the Temescal Wash. The basin covers an area of approximately 13 square miles with an alluvial depth ranging from 30 to 700 feet.

The Bedford-Coldwater Basin is managed under the jurisdiction of the Bedford-Coldwater Groundwater Sustainability Agency (GSA) consisting of the City of Corona, the Temescal Valley Water District and the Elsinore Valley Municipal Water District.

Figure 6.3 is an excerpt from the 2021 Draft Bedford-Coldwater Groundwater Sustainability Plan (GSP) showing the updated combined basin boundary.

Figure 6.3 – Bedford-Coldwater Basin



6.4.2 – Groundwater Management

The City prepared a Groundwater Management Plan (GWMP) in 2008 to assist with (1) operating the Temescal Basin and the Bedford-Coldwater Basin in a sustainable manner and (2) increasing the reliability of the water supply. The GWMP is provided in Appendix G.

In 2017, the City joined the Temescal Valley Water District and the Elsinore Valley Municipal Water District under a Joint Powers Authority agreement to sustainably manage the Bedford-Coldwater Basin via the Sustainable Groundwater Management Act. The Bedford-Coldwater Groundwater Sustainability Plan is provided in Appendix T.

Neither basin providing groundwater supply to the City is adjudicated.

6.4.2.1 – Temescal Basin Management

The City prepared a Recharge Master Plan for the Temescal Basin in 2013 that clarifies groundwater management objectives for the Temescal Basin.

The Recharge Master Plan lays out a series of tasks which the City is currently implementing:

> ***Task 1 Define Goals for Artificial Recharge and Develop Planning Criteria.*** *In this task, we articulate and document the goals and objectives of the Recharge Mater Plan (RMP), define the assumptions and criteria to be used in the investigation, and obtain concurrence from all stakeholders.*
>
> ***Task 2 Characterize Potential Source Waters for Artificial Recharge.*** *In this task, we characterize the quantity, availability, water quality, and cost of the various source waters available for recharge to the Temescal Basin, and evaluate the suitability of these waters for artificial recharge—individually or in combination.*
>
> ***Task 3 Characterize the Universe of Potential Sites for Artificial Recharge.*** *In this task, we identify the universe of potential sites for artificial recharge in the Temescal Basin and characterize the storage capacity and potential recharge capacity at the most promising sites.*
>
> ***Task 4 Develop Alternatives for Artificial Recharge.*** *In this task, we characterize the volume of recharge that could be accomplished under various combinations of source waters, facilities, facility performance, and operations.*
>
> ***Task 5 Evaluate and Rank Alternatives for Artificial Recharge.*** *In this task, we generate the cost opinions associated with each potential recharge project, rank the various recharge projects, and demonstrate how a recharge project or series of recharge projects will meet the City's water resources goals.*
>
> ***Task 6 Prepare Final Recharge Master Plan Report.*** *The information contained in this report will equip the City to make informed decisions on investments in artificial recharge (i.e. prioritization and timing).*

6.4.2.2 – Bedford-Coldwater Sustainable Groundwater Agency

Per the Bedford-Coldwater Sub-Basin of the Elsinore Basin Joint Powers Agreement:

> *The Authority is formed with the purpose and intent of jointly creating a separate legal entity to fulfill the role and legal obligations of a GSA required by SGMA, to include complying with SGMA and ensuring sustainable groundwater management throughout the Sub-Basin, so that the Members may collaboratively and cost effectively develop, adopt, and implement a GSP for the Sub-Basin in -4- accordance with pertinent regulatory timelines. The geographic boundaries of the GSA that will be formed by the Authority, which will encompass the entire Sub-Basin, are as depicted in the map attached hereto as Exhibit "A," which is incorporated herein by reference. The Authority may also represent the Members, as appropriate, in discussions and transactions with other local agencies, to include (but not limited to) the development of inter-basin coordination agreements with other GSAs in Riverside County, and agreements with other local agencies or groundwater sustainability agencies as may be required to ensure compliance with SGMA for the Sub-Basin.*

6.4.3 – Overdraft Conditions

DWR released their final list of critically overdrafted basins in February 2019. The list did not include the Temescal Basin or the Bedford-Coldwater Basin. The Temescal Basin and Bedford-Coldwater Basin are managed to prevent critical overdraft as described in the following subsections.

6.4.3.1 – Temescal Basin Overdraft

The City prepared a Recharge Master Plan for the Temescal Basin in 2013 with a goal of ensuring sustainable production through management of pumping and artificial recharge. The City has implemented the plan and projects are underway to increase the volume of tertiary treated reclaimed water available for recharge and to increase the number and capacity of recharge basins.

According to the Recharge Master Plan, the Temescal Basin is currently in overdraft; however, the rate of overdraft is decreasing as a result of plan implementation.

6.4.3.2 – Bedford-Coldwater Basin Overdraft

The Bedford-Coldwater Basin is sustainably managed under the Bedford-Coldwater GSA.

6.4.4 – Historical Pumping

Historical pumping from the Temescal Basin is provided in Table 6.2.

Table 6.2 – Historical Pumping from the Temescal Basin

Well	2016 (AFY)	2017 (AFY)	2018 (AFY)	2019 (AFY)	2020 (AFY)
Well #7A	1,078	570	1,317	1,186	964
Well #8A	1,744	2,088	1,803	1,492	1,345
Well #9A	1,255	1,320	1,397	1,304	1,295
Well #11A	528	399	803	564	1,081
Well #12A	498	683	799	825	687
Well #13	28	0	0	0	0
Well #14	862	995	948	924	1,009
Well #15	1,099	1,265	882	1,330	1,249
Well #17A	1,202	1,027	1,016	624	827
Well #19	0	0	738	1,276	1,282
Well #22	2,197	2,070	2,242	2,068	1,917
Well #25	1,625	1,778	1,383	800	752
Well #26	174	0	0	0	13
Well #28	681	714	1,080	927	811
Well #27	413	264	432	319	729
Well #29	7	0	0	0	0
Well #31	0	0	621	981	836
Well #33	0	0	0	1,274	1,442
Totals	13,391	13,173	15,461	15,894	16,239

Historical pumping from the Bedford-Coldwater Basin is provided in Table 6.3.

Table 6.3 – Historical Pumping from the Bedford-Coldwater Basin

Well	2016 (AFY)	2017 (AFY)	2018 (AFY)	2019 (AFY)	2020 (AFY)
Well #3	460	3	0	0	0
Well #20	0	0	0	0	0
Well #21	1,508	764	178	0	0
Totals	1,968	767	178	0	0

Well #3, 20, and 21 in the Bedford-Coldwater Basin have been offline recently due to high total dissolved solids.

6.4.5 – Summary of Groundwater Supply

Table 6.4 provides a summary of the existing and projected groundwater supply.

Table 6.4 – Summary of Groundwater Supply

Year	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Bedford-Coldwater Basin	0	2,112	2,112	2,112	2,112	2,112
Temescal Basin	16,239	13,000	13,000	13,000	13,000	13,000

The potable supply available from the Bedford-Coldwater Basin is the current Allowable Production according to the Sustainable Groundwater Management Plan. Allowable Production is the sum of the City's estimated return flows and the City's share of the Native Safe Yield. For purposes of projecting of projecting supply availability, extractions are limited to the City's surface water rights at 2,112 AFY as discussed in the following subsection.

The projected supply available from the Temescal Basin is the estimated future production according to the 2008 GWMP reduced by 40% to account for estimated sustainable yield. The future production is estimated at 21,725 AFY and the reliability of this source is set at 13,000 AFY.

Projected use of non-potable water from the Bedford-Coldwater Basin to supplement the reclaimed water supply is discussed in Section 6.7.

6.5 – Surface Water

The City acquired the rights to the surface flows of Coldwater Canyon in 1964 when it purchased the assets of the Corona City Water Company (CCWC). To meet DPH requirements, the surface flow is now spread in percolation ponds and extracted by wells in the Bedford-Coldwater Basin. The initial native safe yield identified in the agreement is 3,300 AFY, and the City's share of this is 64 percent, or 2,112 AFY. The safe yield is recalculated every five years. The agreement allows the additional pumping of return flows by the City from the previous fiscal year. Administration of these surface rights is incorporated into the management of the Bedford-Coldwater Basin.

6.6 – Stormwater

The City prepared a Storm Drain Master Plan in 2003. The plan includes identification and analysis of all stormwater infrastructure in the City, including streets, drains, channels, catch basins, inlets, outlets, detention basins and drainage areas.

These are no existing or planned projects to capture runoff for aquifer augmentation.

6.7 – Wastewater and Recycled Water

Water Code Section 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

Per the Reclaimed Water Master Plan and the Recharge Master Plan, the existing volume of tertiary treated wastewater allocated to future reclaimed water use is 6,873 AFY.

Per an agreement between the City and the Western Riverside County Regional Wastewater Authority (WRCRWA), the City will receive up to 2.0 MGD (2,240 AFY) of Title 22 tertiary treated reclaimed water upon completion of the transmission main.

Non-potable groundwater from the Bedford-Coldwater Basin is used to supplement the reclaimed water supply during peak demand months in the summer.

The sum of these non-potable sources is estimated at 10,000 AFY.

Table 6.5 provides a summary of existing and projected reclaimed water supply.

Table 6.5 – Summary of Reclaimed Water Supply

Year	2020	2025	2030	2035	2040	2045
Reclaimed Water (AFY)	12,695	10,000	10,000	10,000	10,000	10,000

6.7.1 – Recycled Water Coordination

Water Code Section 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area…

The City owns and operates wastewater collection and treatment, and reclaimed water distribution within the water service area.

6.7.2 – Wastewater Collection, Treatment and Disposal

> *Water Code Section 10633(a)*
>
> *A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*

6.7.2.1 – Wastewater System

The City collects and treats wastewater throughout the service area. The City prepared a Sewer Master Plan (SMP) in 2005. The SMP includes detailed description and analysis of the existing and future wastewater collection and treatment systems, loading, modeling, evaluation criteria, and maintenance.

Per the SMP:

Wastewater System General Description

The City's existing wastewater system currently provides for collection and treatment of wastewater generated within its corporate boundaries, as well as a small portion of the neighboring community of Norco. The components of the system include 368 miles (1,941,000 feet) of gravity sewer pipe, 14 sewer lift stations and the associated forcemains, and three (3) wastewater treatment plants.

Gravity System

The gravity system consists of approximately 368 miles of pipe ranging in size from 6-inches to 42-inches in diameter. Approximately 83 percent of the pipes are 8-inch in diameter. The majority of the system was built in the 1980's, and 1990's. Construction date information was unavailable for approximately 313,000 feet of pipe.

Lift Stations

There are 14 sewer lift stations located throughout the service area serving low lying or fringe areas of the City that cannot be served by the gravity system.

Wastewater Treatment Plants

The City owns and operates three wastewater treatment plants. The effluent produced meets criteria for discharge to percolation ponds, Temescal Creek and California Title 22 reuse.

Wastewater Treatment Plant 1 (WWTP 1) *was constructed in 1967-1968 and expanded in 1998. The expansion included a new headworks, grit removal, expanded tertiary filters, and UV disinfection. The latter allowed the City to terminate use of its percolation ponds in the Prado Basin. It serves the western portion of the City as well as a small portion of the City of Norco. The plant operates under and complies with the California Regional Water Quality Control Board, Santa Ana Region, Waste Discharge and Producer/User Reclamation Requirements Order No. 01-55, NPDES No. CA80000383. WWTP 1 is located at 2205 Railroad Street, between Klug Circle and Citation Circle.*

WWTP 1 consists of preliminary treatment, two secondary treatment facilities (Plant 1A and 1B), and a tertiary treatment facility. Up to 5.5 MGD of the flow from the headworks is directed to Plant 1A, which provides a biological nitrogen removal activated sludge process and secondary clarification. Up to 6.0 MGD is conveyed through Plant 1B, which has two oxidation ditches with biological nitrogen removal and secondary clarification…

The current firm treatment capacity is 11.5 MGD. With improvements, the future reliable treatment capacity is expected to be 14.5 MGD. Combined, both plants are operated to handle a total instantaneous design peak flow of 37.7 MGD.

***Wastewater Treatment Plant 2 (WWTP 2)** was formerly called Sunkist Treatment Plant, which was used to treat industrial process wastewater. In 1986, the City purchased the plant and had it renovated to provide primary and secondary treatment. WWTP 2 became operational in 1988. It now serves the eastern and northeastern portions of the City. The plant operates under and complies with the California Regional Water Quality Control Board, Santa Ana Region, Waste Discharge Requirements Order No. 98-3. WWTP 2 is located at 650 E. Harrison Avenue, just north of SR-91 and west of Temescal Wash.*

WWTP 2 is a conventional activated sludge facility with the ability to bypass flows to WWTP 1… The current firm treatment capacity is 3.0 MGD. With improvements, the future reliable treatment capacity is expected to be 3.5 MGD. The instantaneous design peak flow is 7.0 MGD.

The Sunkist Lift Station lifts sewage up to the headworks of the plant. Flows in excess of the WWTP 2 3.0 MGD capacity are diverted to WWTP 1 for treatment. Flexibility is provided, as the entire WWTP 2 flow can be diverted to WWP 1.

From the treatment plant, primary and waste activated sludge is pumped via a 6-inch forcemain directly to WWTP 1 where it is combined with sludge from WWTP 1 for solids processing and disposal.

***Wastewater Treatment Plant 3 (WWTP 3)** was constructed in 2001 and serves the southeastern portion of the City. The plant operates under and complies with the California Regional Water Quality Control Board, Santa Ana Region, Waste Discharge and Producer/User Reclamation Requirements Order No. 01-79, NPDES No. CA80000395. WWTP 3 located at 20730 Temescal Canyon, just south of Cajalco Road.*

WWTP 3 is a water reclamation plant that provides Title 22 reclaimed water for reuse. Its current reliable treatment capacity is 1.0 MGD… Currently, the plant treats approximately 0.3 MGD.

Sludge effluent is pumped via a 6-inch forcemain northwest to an existing manhole in Chase Drive just south of Teddy Bear Lane. The sludge then re-enters the gravity system and flows to WWTP 2 for processing. There are two 700 gpm sludge pumps that operate one at a time. Currently the sludge pumps operate a total average of 3.5 hours per day and pump an average of 20,000 gpd.

Since development of the SMP in 2005, some WWTP processes and/or future expansion plans have changed. Starting in 2013, WWTP 1 began discharging only tertiary effluent; currently, this effluent is either reused onsite, sent through the recycled water distribution system, dechlorinated and sent to Temescal Creek, or pumped to the Lincoln Avenue and Cota Street percolation ponds. WWTP 2 also now discharges only tertiary effluent to the recycled water distribution system or the Lincoln Avenue and Cota

Street percolation ponds. WWTP 3, which currently provides Title 22 reclaimed water for reuse, will be decommissioned in 2022.

6.7.2.2 – Quantities of Treated Wastewater

Quantities of treated wastewater are provided in the tables in units of AFY.

Effluent from WWTP-1 is discharged to Temescal Creek, percolation ponds, and the reclaimed water system. A summary of WWTP-1 effluent is provided in Table 6.6.

Table 6.6 – Summary of WWTP-1 Effluent

Year	Tertiary Treated Effluent to Creek (AFY)	Effluent to Reclaimed Water System (AFY)	Tertiary Treated Effluent to Ponds (AFY)	Total Effluent (AFY)
2016	7,198	3,602	1,364	12,164
2017	1,711	5,700	5,273	12,684
2018	2,618	5,858	4,493	12,969
2019	2,116	5,377	5,026	12,519
2020	1,770	5,580	4,987	12,336

Effluent from WWTP-2 is discharged to percolation ponds and the reclaimed water system. A summary of WWTP-2 effluent is provided in Table 6.7.

Table 6.7 – Summary of WWTP-2 Effluent

Year	Effluent to Reclaimed Water System (AFY)	Secondary Treated Effluent to Ponds (AFY)	Tertiary Treated Effluent to Ponds (AFY)	Total Effluent (AFY)
2016	994	730	734	2,458
2017	939	0	1,207	2,146
2018	868	0	1,306	2,174
2019	649	0	1,462	2,111
2020	371	0	1,774	2,144

Effluent from WWTP-3 is discharged to the reclaimed water system. A summary of WWTP-3 effluent is provided in Table 6.8.

Table 6.8 – Summary of WWTP-3 Effluent

Year	Effluent to Reclaimed Water System (AFY)	Total Effluent (AFY)
2016	826	826
2017	707	707
2018	762	762
2019	890	890
2020	954	954

6.7.3 – Recycled Water System Description

Water Code Section 10633 (c)

A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

The City prepared a Reclaimed Water Master Plan in 2018. The plan includes detailed description and analysis of the existing and future reclaimed water distribution systems, demand, modeling, and evaluation criteria.

The City delivers Title 22 reclaimed water to non-potable customers via a dedicated distribution system for landscaping irrigation, toilet flushing via dual plumbed system, firefighting, dust control, and various construction applications.

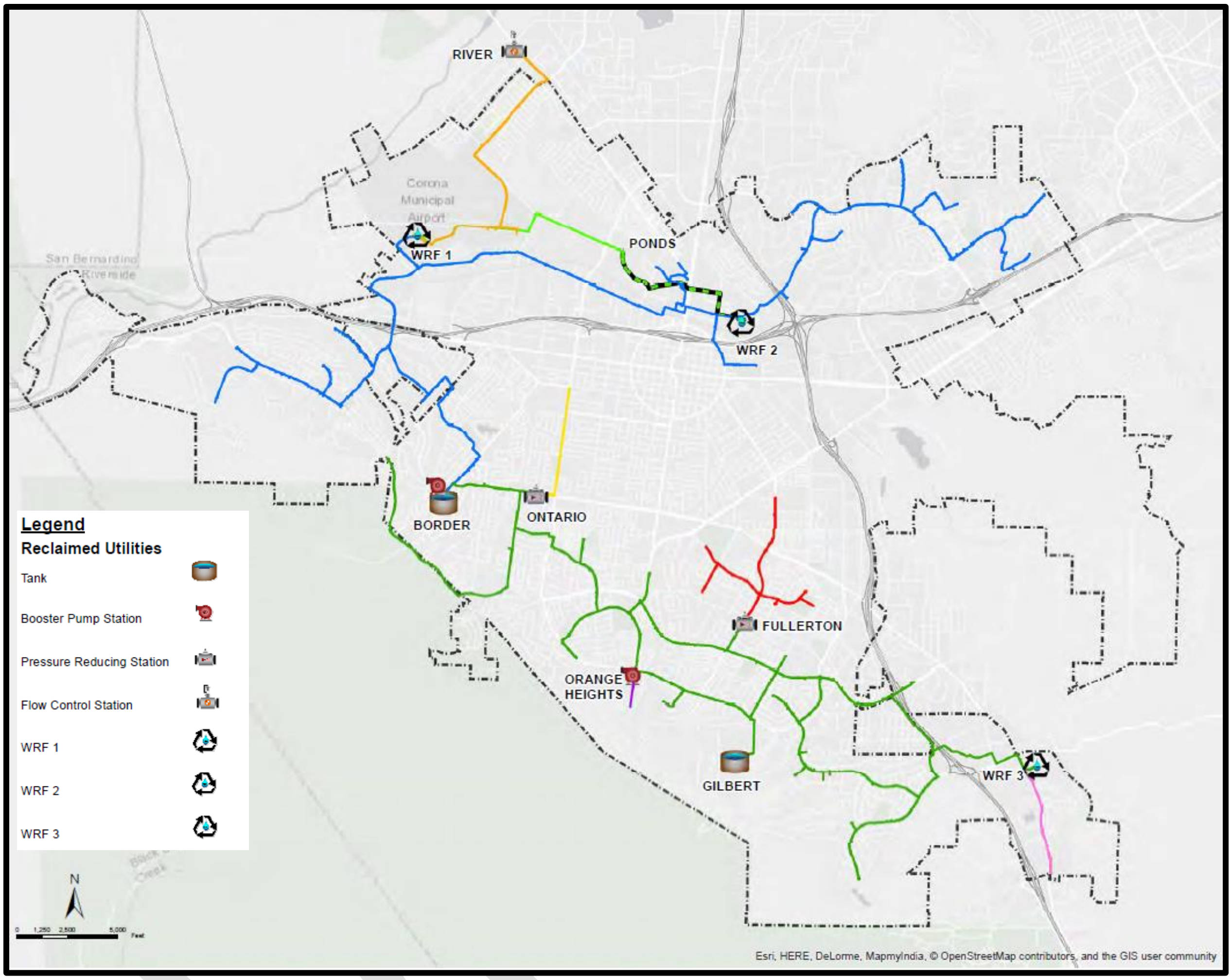
Reclaimed water delivery began in 2007. Historical quantities are provided in Table 6.9.

Table 6.9 – Historical Reclaimed Water Deliveries

Year	AFY
2016	4,218
2017	4,567
2018	4,569
2019	4,200
2020	3,781

A map of the reclaimed water distribution system is provided in Figure 6.4, an excerpt from the 2018 Reclaimed Water Master Plan.

Figure 6.4 – Reclaimed Water System Map



6.7.4 – Potential, Current and Projected Recycled Water Uses

Water Code Section 10633

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

6.7.4.1 – Potential Beneficial Uses of Reclaimed Water

The Reclaimed Water Master Plan has identified opportunities for conversion of potable irrigation customers to reclaimed water. In addition, ongoing land development will use reclaimed water for irrigation. Future irrigation demand for potable conversion and new construction is estimated at 3,974 AFY.

The Dos Lagos Specific Plan identifies irrigation, construction, and non-contact recreational impoundment opportunities.

The Sierra Bella Specific Plan identifies irrigation opportunities.

The Arantine Hills Specific Plan identifies irrigation and dual plumbing opportunities.

The City has a policy of converting industrial buildings to dual plumbing if the buildings are located near a reclaimed water pipeline.

6.7.4.2 – Projected Use of Reclaimed Water

The 2018 Reclaimed Water Master Plan breaks down future projects to add recycled water demand into the following categories:

- Large Distribution Pipelines
- Medium Distribution Pipelines
- Small Distribution Pipelines
- Conversion of Adjacent Demands

Table 6.10 provides a summary of large distribution pipeline projects.

Table 6.10 – Large Reclaimed Water Distribution Pipeline Projects

Project	AFY
Buena Vista Tenth Pipeline	205
Ontario Slipline	211
Sampson Pipeline	222
River Pipeline	204

Table 6.11 provides a summary of medium distribution pipeline projects.

Table 6.11 – Medium Reclaimed Water Distribution Pipeline Projects

Project	AFY
Old Temescal Pipeline	24
Lincoln Foothill Pipeline	20
Avenida Del Vista Pipeline	32
Border Pipeline	59
Promenade Pipeline	43
Research Pipeline	15
Smith Pipeline	22
Via Pacifica Pipeline	34
Tehachapi Pipeline	10

Table 6.12 provides a summary of small distribution pipeline projects.

Table 6.12 – Small Reclaimed Water Distribution Pipeline Projects

Project	AFY
Jenks Pipeline	9
Airport Circle Pipeline	7
Helicopter Pipeline	6
Glider Pipeline	2
Citation Pipeline	2
Klug Pipeline	6
Monica Pipeline	5
Chase Hudson Pipeline	8
Cessna Pipeline	5
Main Citrus Pipeline	35

The City anticipate converting existing potable water irrigation to reclaimed water irrigation for smaller customers adjacent to existing reclaimed water pipeline. Table 6.13 provides a summary of conversion of adjacent demands.

Table 6.13 – Conversion of Adjacent Demands

Project	AFY
Commercial	26
Industrial	109
Institutional	1
Multi-Family Residential	65
Single Family Residential	24

Table 6.13 provides a summary of all future reclaimed water demands cited in the 2018 Reclaimed Water Master Plan.

Table 6.14 – Conversion of Adjacent Demands

Project	AFY
Large Distribution Pipelines	842
Medium Distribution Pipelines	259
Small Distribution Pipelines	85
Conversion of Adjacent Demands	225
Total	1,411

Project implementation will depend on funding and opportunity. The City anticipates adding approximately 350 AFY every five years. These projections are shown in Table 6.15.

Table 6.15 – Reclaimed Water Demand Projection

Year	2025	2030	2035	2040	2045
Reclaimed Water Demand (AFY)	4,795	5,145	5,495	5,845	6,195

6.7.4.3 – Planned vs. Actual Reclaimed Water Use

The 2015 UWMP projected reclaimed water use in 2020 at 5,111 AFY. The actual 2020 volume delivered was 3,781 AFY. The 2015 projection assumed continued expansion of the reclaimed water distribution system and the addition or conversion of 350 AFY of potable to reclaimed water demand. However, due to delays associated with environmental review, these planned expansion projects were not able to be completed by 2020.

6.7.5 – Actions to Encourage and Optimize Future Recycled Water Use

Water Code Section 10633

The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier… and shall include the following:

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

The City will continue implementation of the Reclaimed Water Master Plan which calls for expansion of the reclaimed water system for conversion of irrigation from potable to reclaimed water.

Ordinance 2854 establishes rules and regulations related to reclaimed water use, including the importance of revisions and updates to the Reclaimed Water Master Plan with respect to identifying qualified potential customers. Per the Ordinance:

> *General*
>
> *The City of Corona is primarily dependent on imported water for domestic, commercial and industrial uses. This imported supply is considered limited and its future reliability uncertain. In addition, transport of imported water requires tremendous energy input which constitutes a considerable portion of the total water cost to the end user. It is in the best interest of the City of Corona to promote and implement innovative water management strategies to conserve water and energy resources while still satisfying the needs of its citizens.*
>
> *On July 5, 2001, the Corona City Council adopted the Recycled Water Master Plan, which provides for the planning of wastewater reclamation facilities, fostering the use of recycled water, controlling its safe distribution, and permitting and regulating its use. On July 18, 2001, the City Council adopted Ordinance 2544 establishing general provision related of use of recycled water (the "Recycled Water Ordinance"). The basis for the ordinance is California Water Code Section 13551, which state that the continued use of potable water for greenbelt irrigation and certain other non-domestic water uses is an unreasonable use of water if recycled water is available and suitable for such purposes.*
>
> *The use of recycled water from domestic or municipal sewage is regulated by the California Regional Water Quality Control Board (RWQCB). California Water Code Section 13551 established a state policy to encourage the use of recycled water. Permission to use recycled water is based on the ability adequately treat domestic wastewater to the point that the recycled water (effluent) meets the requirements of Title 22, Chapter 3 regulations of the California Water Code. Title 22 was promulgated by the State Department of Health Services to ensure proper health protection and specify the degree of treatment to match the intended applications.*
>
> *The adoption of the Recycled Water Ordinance and in coordination with Section 13.28.040(c) of the Municipal Code, the following Rules and Regulations have been*

developed to govern the distribution and use of Section 3 Study Area 3-12 2018 Reclaimed Water Master Plan recycled water for landscape irrigation and other non-potable uses as they become available.

These regulations address the application of recycled water for irrigation and construction use. Other proposed uses will be reviewed on a case by case basis by the Director of the regulatory agencies. In all cases, the City's approval of any proposed use will be contingent upon the proposed use being acceptable to the regulatory agencies. Only those uses specified in the User Agreement are authorized uses.

Policy

It is the policy of the City of Corona that recycled water be used for any purposes or project approved for recycled water use, when it is economically, financially and technically feasible, as mandated by the Recycled Water Ordinance. Use of potable water for non-domestic uses shall be contrary to the City policy, shall not be considered the most beneficial use of a natural resource and shall be avoided to the maximum extent possible.

The distribution and use of recycled water shall be consistent with the standards and requirements of regulatory agencies for the protection of public health and welfare, and the preservation of the quality of the environment.

All offsite facilities are the responsibility of the Director and shall be under the management and control of the City. Only the Director and those authorized by the Director shall have any right to operate said system and/or property in any manner. The Director shall be responsible for the operation of the offsite distribution system and for the surveillance of all users. Users shall be responsible for the quality assessment of recycled water as it relates to compliance with requirements of the regulatory agencies.

The City reserves the right to take any action with respect to the operation of the recycled water system and at such time as it deems proper to safeguard public health.

Purpose

The Rules and Regulations set forth herein pertain to recycled water service provided by the City of Corona within the City's service area. These Rules and Regulations establish procedure for the distribution and use of recycled water on public and/or private property.

The City shall enforce these regulations in all matters concerning the use of recycled water and/or recycled water service. Each and every condition and Section 3 Study Area 3-13 2018 Reclaimed Water Master Plan requirement with respect to the use, connection, disconnection, reconnection, and/or discontinuance of recycled water and/or recycled water service provided by and set forth in these regulations, shall apply with equal force and effect to any person, persons, or firm, public or private. There shall be deviation from these regulations except upon authorization by the City, who will act all times within any and all regulatory agency constraints. An approved standard appeals procedure shall be provided and action of the Council shall be final.

These regulations may be amended by Council resolution at any regular or special meeting for cause determined by the Council or City staff, and without the approval of any user or owner. These Rules and Regulations shall be interpreted in accordance with the purposes, policy and intent of the Recycled Water Ordinance and the definitions set forth in Section

2 herein. Moreover, any amendments so made are immediately incorporated by these regulations and will be administered as such. Insofar as these regulations are based upon portions of the California Code of Regulations, Title 17, Title 22, and amendments to those documents are hereby also incorporated by these regulations. These regulations shall take precedent when requirement contained herein are more stringent than those specified by Federal, State or local governing codes, rules and regulations.

Recycled water service from the City is subject to the availability of facilities and adequate capacity in these facilities to move recycled water to the location of the proposed use.

It is the general intent of the City to provide recycled water to all service areas in the City identified in the Recycled Water Master Plan and subsequent additions, revisions or updates of the plan, herein referred to as "Master Plan". It is the intent of the City that existing owners of property, identified in the Master Plan as being potential users within are as designated for recycled water use, qualify for a recycled water permit from the City in accordance with the Rules and Regulations.

Insofar as these Rules and Regulations support portions of the California Code of Regulations, Title 22, any amendment of the California Code of Regulations which may be pertinent to the Rules and Regulations shall be incorporated accordingly

6.8 – Desalinated Water Opportunities

Water Code Section 10631(g)

Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

Located in an inland region, the City does not have access to ocean water desalination opportunities.

There are no brackish groundwater desalination opportunities in the vicinity.

The City currently receives supply from two sources of desalinated groundwater: the Temescal Desalter and the Arlington Desalter.

There are no additional opportunities for desalinated water.

6.8.1 – Temescal Desalter

The Temescal Desalter, owned and operated by the City, is a reverse osmosis (RO) treatment facility where Temescal Basin groundwater high in Total Dissolved Solids (TDS) is forced one-way through membranes that reject salts as waste brine. The Temescal Desalter produces 10 million gallons of product water each day. The City blends this water with 5 million gallons per day of locally produced groundwater.

The waste brine is discharged to the Santa Ana River Interceptor (SARI) and eventually reaches specially equipped treatment plants operated by the Orange County Sanitation District (OCWD). After treatment, the waste is discharged to the Pacific Ocean.

In terms of water supply data management, the City accounts for groundwater pumping, brine waste discharge and blending in the operation of the Temescal Desalter.

6.8.2 – Arlington Desalter

The Arlington Desalter, owned and operated by WMWD, is a reverse osmosis (RO) treatment facility where Arlington Basin groundwater is forced one-way through membranes that reject salts as waste brine. The Arlington Desalter produces 3.7 million gallons per day. The facility is scheduled to be expanded in the future to produce 7.2 million gallons per day.

Supply from the Arlington Desalter primarily serves the cities of Norco and Riverside with excess production made available to the City of Corona.

6.9 – Water Exchanges and Water Transfers

> *Water Code Section 10631(c)*
>
> *Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.*

The City maintains connections with WMWD, Riverside, Norco, TVWD and Home Gardens County Water District. These connections provide opportunities for exchange and transfer among the systems.

6.9.1 – Home Gardens County Water District

The City has entered into an agreement with Home Gardens County Water District as follows:

- Home Gardens has historically produced groundwater from the Temescal Basin. Currently, water quality from Home Gardens wells is poor.
- Home Gardens purchases all of its water from the City.

6.9.2 – City of Riverside

The City of Corona has historically imported water from the City of Riverside. In recent years, no water has been imported.

6.9.3 – City of Norco

The City of Corona has historically sold water to the City of Norco. The City anticipates continued sales to the City of Norco at a rate of 1,500 AFY.

6.9.4 – TVWD

The City has historically transferred water to TVWD. In recent years, no water has been imported.

6.10 – Future Water Projects

Water Code Section 10631 (f)

Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

6.10.1 – Groundwater Treatment

The Bedford-Coldwater Basin was recently declared to be under the direct influence of surface water. In 2020, the City did not produce any groundwater from the Coldwater Basin due to lack of treatment with respect to the influence of surface water. The City is reviewing options for treatment and intends to bring Bedford-Coldwater Basin production back online by 2025.

6.10.2 – Reclaimed Water Supply Improvements

The City of Corona Department of Water and Power has entered into an agreement with the Western Riverside County Regional Wastewater Authority (WRCRWA) to treat a portion of the City's wastewater and provide the City with up to 2.0 MGD of Title 22 tertiary treated reclaimed water. The City is currently preparing plans for the design of the transmission main to deliver this water to the City from the WRCRWA Wastewater Treatment Plant.

This project will improve reclaimed water supply reliability and provide the City with flexibility in the way it allocates reclaimed water to direct reuse and groundwater management.

6.10.3 – Bedford-Coldwater Recharge Basin

Surface mining in the Bedford-Coldwater Basin is anticipated to be completed within twenty years. At that time, the Coldwater Pit will be converted to a recharge basin, enhancing groundwater storage capacity in the Bedford-Coldwater Basin.

This project will not increase normal supply; however, under single dry year and multiple dry year conditions, stored groundwater may be used to offset a drop in imported water supply availability.

6.11 – Summary of Existing and Planned Sources of Water

Water Code 10631

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following…

(b)(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier's plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

Table 6.16 provides a summary of existing and projected supplies discussed in the chapter.

Table 6.16 – Supply Summary

Year	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Imported Water	18,005	21,110	21,110	21,110	21,110	21,110
Temescal Basin	16,239	13,000	13,000	13,000	13,000	13,000
Bedford-Coldwater Basin	0	2,112	2,112	2,112	2,112	2,112
Reclaimed Water	12,695	10,000	10,000	10,000	10,000	10,000
Total	**46,939**	**46,222**	**46,222**	**46,222**	**46,222**	**46,222**

6.12 – Climate Change Impacts to Supply

Per the City of Corona 2012 Climate Action Plan:

The City acknowledges that electricity is used to move and treat potable water, reclaimed water and wastewater contribution to GHG emissions.

The City acknowledges its authority to implement the Water Shortage Contingency Plan in the event of a water shortage.

Regarding Water Conservation:

> *In 2008 Corona adopted ordinance 2949 which revised the landscape requirements for water conservation for residential, commercial, and industrial development projects to reflect changes in state law. The ordinance was adopted to coincide with the adoption of the Landscape Design Guidelines for Commercial and Industrial Developments. On February 22, 2010 the City adopted the revised Landscape Design Guidelines for Residential Development and revised Landscape Design Guidelines for Commercial and Industrial Developments. The guidelines were established to create a more pleasant living and working environment and promote water and resource conservation, including but not limited to, storm water retention/percolation and best management practices. The landscape design guidelines complement the mandatory site development regulations contained in the City's Zoning Ordinance and Specific Plans. The guidelines will be utilized during the City's plan review process to accomplish the goals of ensuring highest level of resource conservation, promoting water-efficient landscaping, encouraging flexibility in design, complying with state guidelines for landscape water demand, and eliminating water waste.*

The City acknowledges that the use of recycled water is a cost-effective way to offset potable water demand and improve groundwater recharge.

The City acknowledges water use efficiency and water conservation as effective methods to reduce GHG emissions:

> *WATER CONSERVATION PROGRAM*
>
> *Under this program the excessive watering of landscaping, excessive fountain operation, watering during peak daylight hours, water of non-permeable surfaces, excessive water use for noncommercial washing, and water use resulting in flooding or runoff would be prohibited. In addition the program would encourage efficient water use for construction activities, the installation of low-flow toilets and showerheads for all new developments, use of drought-tolerant plants with efficient landscape watering systems for all new developments, recycling of water used for cooling systems, use of pool covers, and the posting of water conservation signage at all hotels.*
>
> *NEW DEVELOPMENT INCENTIVES*
>
> *Provide incentives for developers to comply with the California Green Building Standards Code as requirements for all new development. Under this Code new developments are required to reduce indoor potable water use by 20% beyond the Energy Policy Act of 1992 fixture performance requirements, and to reduce outdoor potable water use by 50% from*

a mid-summer baseline average consumption through irrigation efficiency, native plant selection, the use of recycled water and/or captured rainwater for example.

WATER EFFICIENCY RETROFIT PROGRAM

This program would encourage upgrades in water efficiency for renovations or additions of residential, commercial, office, and industrial properties equivalent to that of new developments. The City would work with local water purveyors to achieve consistent standards, and to develop, approve, and review procedures for implementation.

INCREASED RECYCLED WATER USE

Promote the use of municipal wastewater and graywater for agricultural, industrial and irrigation purposes. This measure would be subject to approval of the State Health Department and compliance with Title 22 provisions. This measure would facilitate the following:

- *Inventory of non-potable water uses that could be substituted with recycled or graywater;*
- *Determination of the feasibility of producing and distributing recycled water for groundwater replenishment;*
- *Determine the associated energy/GHG tradeoffs for treatment/use vs. out of basin water supply usage;*
- *Cooperation and coordination with responsible agencies to encourage the use of recycled water where energy tradeoffs are favorable.*

WATER EFFICIENCY TRAINING AND EDUCATION

Under this measure the City, in coordination with local water purveyors would implement a public information and education program that promotes water conservation. The program could include certification programs for irrigation designers, installers, and managers, as well as classes to promote the use of drought tolerant, native species and xeriscaping.

The City acknowledges funding mechanisms for the water conservation:

Clean Water State Revolving Funds. CWSRFs fund water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management. CWSRFs have funded over $74 billion, providing over 24,688 low-interest loans to date.

CWSRF's offer:

- *Low Interest Rates, Flexible Terms—Nationally, interest rates for CWSRF loans average 2.3 percent, compared to market rates that average 5 percent. For a CWSRF program offering this rate, a CWSRF funded project would cost 22 percent less than projects funded at the market rate. CWSRFs can fund 100 percent of the project cost and provide flexible repayment terms up to 20 years.*
- *Funding for Nonpoint Source Pollution Control and Estuary Protection—CWSRFs provided more than $167 million in 2009 to control pollution from nonpoint sources and for estuary protection, more than $3 billion to date.*

- *Assistance to a Variety of Borrowers—The CWSRF program has assisted a range of borrowers including municipalities, communities of all sizes, farmers, homeowners, small businesses, and nonprofit organizations.*
- *Partnerships with Other Funding Sources—CWSRFs partner with banks, nonprofits, local governments, and other federal and state agencies to provide the best water quality financing source for their communities.*

The City's research into climate change found no impacts on local water supply.

6.13 – Energy Intensity

Water Code 10631.2. (a)

In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

Table 6.17 provides a summary of energy used in the potable water system during 2020. Additional analysis is provided in Appendix L.

Table 6.17 – Energy Intensity Analysis

Energy Use	Volume (AF)	Energy (KWH)	Intensity (KWH/AF)
Extraction	20,170	21,236,149	1,053
Treatment	16,743	627,687	37
Distribution	32,789	36,523,981	1,114

Chapter 7 – Water System Reliability

7.1 – General Description

Water Shortage Reliability provides a review of the reconciliation of projected supply and demand under normal years, single dry year, and five consecutive dry years conditions.

7.2 – Water Service Reliability Assessment

Water Code Section 10635(a)

Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

7.2.1 – Constraints on Water Sources

Water Code section 10631 (b)(1)

A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

7.2.1.1 – Wholesaler Constraints

Per the WMWD 2020 Draft UWMP (see Appendix J):

> *(pp. 6-2 et seq.)*
>
> *The majority of Western's supplies are imported water purchased from Metropolitan, and as described below, Western's supply reliability analysis follows the analysis and data developed by Metropolitan as presented in Metropolitan's 2020 UWMP. Metropolitan described several challenges in providing adequate, reliable, and high-quality supplemental water supplies along with potential management measures in the Metropolitan 2020 UWMP.*

Potential constraints to Metropolitan supplies and associated supply reliability include:

Drought

The water conditions that the region faced leading up to 2020 were characterized by alternating scarcity and abundance. While investments in storage and flexible operations have prepared Metropolitan to capitalize on available supplies in wet years and manage through drought years, drought challenges remain. The Colorado River Basin has historically experienced large swings in annual hydrologic conditions and has exhibited a drying trend over the last 21 years. Changes in this period have been mitigated by actions taken by Metropolitan in cooperation with the Bureau of Reclamation and the other Basin States to maintain system storage, avoiding a shortage declaration. At the close of 2020, however, system storage was at or near its lowest since 2000, so there is less water available to buffer future dry conditions. The Sacramento-San Joaquin Delta (Bay-Delta) has suffered reduced flows and rising temperatures and SWP supplies have been significantly reduced at times, with a record low allocation of 5 percent in 2014.

Environmental/Ecological Needs (Operational Constraints)

Sensitive species in the Bay-Delta system require base flows for survival; these flows are threatened by drought and other factors, reducing the volume of water available for pumping to the SWP. As species become further stressed, environmental demands on Bay-Delta water may increase. Operational constraints will likely continue until a long-term solution to the problems in the Bay-Delta is identified and implemented.

Climate Change

Climate change is anticipated to increase the frequency and intensity of droughts and flooding, reduce Sierra Nevada snowpack, change runoff pattern and amount, raise average temperatures, and raise sea levels. These effects may reduce the availability of supplies in the Bay-Delta and Colorado River systems. Sea level rise poses a significant challenge to the salt balance in the Bay-Delta and could result in pumping restrictions. Sea level rise also increases the vulnerability of the Bay-Delta supply to seismic events.

Threats to Infrastructure

Metropolitan's imported supplies must travel across large distances to reach turnouts where local agencies are able to access the water. California is a seismically active state and prone to wildfires, which could damage imported water infrastructure anywhere along the SWP or Colorado River Aqueduct in such a manner as to disrupt supply availability. California is also a large state with a large economy, housing some major industries and defense installations. This makes it a potential target for acts of terrorism, including potential threats to its water supplies and infrastructure.

Water Quality

Water quality challenges, such as salinity, algae toxins, disinfection byproduct precursors, nutrients, and the identification of constituents of emerging concern, have the potential to impact imported water supplies. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. Salinity, particularly Colorado River supplies, is a significant issue, but Metropolitan anticipates the only constraint will be the need to blend Colorado River water with SWP supplies to meet salinity needs.

Metropolitan's 2020 UWMP describes a variety of past and ongoing actions to address these water supply challenges to maintain water reliability within its service area.

Metropolitan's proactive measures include:

Continuing Water Conservation

Metropolitan supports financial incentives, education, outreach programs and appliance/plumbing standards at both the regional and local level. Metropolitan also works with member and local agencies, including Western, to help identify opportunities and procure grant funding for conservation programs.

Increasing Local Resources

Since 1982, Metropolitan has assisted local agencies in the development of water recycling and groundwater recovery under the Local Resources Program (LRP). The LRP program has been expanded to provide incentives for on-site recycled water retrofit costs and development of other water resources including seawater desalination and stormwater.

Augmenting Water Supplies

Augmenting water supplies through water transfers and exchanges is an element of Metropolitan's Integrated Resources Plan (IRP) to mitigate water shortages during dry periods.

Increasing Storage Programs

Metropolitan has a number of storage programs with water agencies along the California Aqueduct that would allow it to store SWP supplies during surplus conditions and to have stored water returned when needed. Metropolitan has invested in infrastructure to allow more effective use of stored water when needed and has also developed additional storage programs.

Modifying Metropolitan's Distribution System

Driven by the historic low SWP allocation in 2014, Metropolitan and several member agencies have made operational and system modifications to enhance operational flexibility and efficient delivery of Colorado River, SWP, and in-region supplies within Metropolitan's service area. Within Western's service area, the Inland Feeder-Lakeview Pipeline Intertie, which was completed in 2016 and allows for delivery of water from Diamond Valley Lake to Mills WTP, increases Western's imported water supply reliability. This intertie enables the Mills WTP to withstand an extended interruption of supplies from the California Aqueduct East Branch. The intertie also provides delivery flexibility to handle any required repairs by DWR to the Santa Ana Valley Pipeline north segment.

Implementing Shortage Response Actions (when needed)

Metropolitan developed a Water Shortage Contingency Plan (WSCP) to be consistent with elements of the existing Metropolitan Water Surplus and Drought Management Plan (WSDM) and Water Supply Allocation Plan (WSAP). If needed, Metropolitan will implement shortage response actions to distribute limited imported supplies and preserve storage reserves.

Pursuing Long-term Solutions in the Bay-Delta

Metropolitan adopted a Delta action plan in June 2007 that includes a long-term Delta Plan. The long-term action plan recognizes three basic elements that must be addressed: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development.

Maintaining Water Quality

Metropolitan responds to water quality concerns by protecting the quality of the source water, developing water management programs that maintain and enhance water quality, and changing water treatment protocols or blending.

Planning for Climate Change

In addition to many other activities related to climate change, Metropolitan is currently developing an updated 2020 Integrated Resources Plan (IRP), which recognizes risks and uncertainties from climate change and other sources. Metropolitan has established an intensive, comprehensive technical process to identify key vulnerabilities to regional reliability, including climate change. This Robust Decision Making (RDM) approach was used with both the 2015 and 2010 IRP Updates. This methodology can show how vulnerable the region's reliability is to longer-term risks such as climate change and can also establish "signposts" that can be monitored to see when critical changes may be happening.

To maintain a reliable source of imported water supply for its member agencies, Metropolitan has and will continue to contend with these considerable challenges. After learning from the droughts of 1977-78 and 1989-92,Metropolitan, in conjunction with its member agencies, instituted a resource planning process that is based on diversification of the region's water supply portfolio and continued efficient water use. This integrated resource planning process has recognized that only through a mix of imported and member agency local supplies, along with aggressive implementation of water conservation, can the Metropolitan service area attain overall reliability of water supply.

This integrated planning effort has resulted in the following documents:

Integrated Resources Plans (IRP)

Metropolitan's IRP process assessed potential future regional demand projections based upon anticipated population and economic growth as well as conservation potential. The IRP also includes regional supply strategies and implementation plans to better manage resources, meet anticipated demand, increase overall system reliability, and adapt to the effects of climate change. Metropolitan is currently preparing the 2020 IRP.

1999 Water Surplus and Drought Management Plan

The Water Surplus and Drought Management Plan provides the policy guidance to manage the region's water supplies by integrating the operating activities of supply surplus and shortage to achieve the reliability goals of the IRP.

Water Supply Allocation Plan

The Water Supply Allocation Plan, last updated in 2014, includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering the allocation. The need for the Water Supply Allocation Plan arose after the 2008 Bay- Delta biological opinions and rulings that limited SWP supplies to its contractors including Metropolitan. The Water Supply Allocation Plan formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies up to 50 percent.

All these planning documents recognize that the reliability of the Metropolitan service area is dependent on improving the reliability of imported supplies from the Colorado River and State Water Project as well as the successful implementation of future local supplies and conservation. This dependence on an integrated approach to water reliability and diversification of supplies has been the foundation of DWR's State Water Plan, through its last several updates and is the cornerstone of Governor Newsom's California Water Resilience Portfolio. Some of the most significant factors affecting reliability for imported water supplies include legal, environmental, water quality and climatic changes. Successful implementation of Metropolitan's UWMP is dependent on the continued successful implementation of local supply projects by local agencies, including Western and their wholesale customers.

7.2.1.2 – City Constraints

There are no constraints on reclaimed water supply.

There are no constraints on groundwater supply from the Temescal Basin.

Groundwater from the Coldwater-Coldwater Basin does not meet water quality standards and is not in use. The City plans to implement water treatment for this source. For planning purposes, potable groundwater from the Bedford-Coldwater Basin is considered unavailable until 2025.

7.2.2 – Year Type Characterization

There are three Year Types included in the water service reliability assessment: Normal Year, Single Dry Year, Five-Consecutive-Year Drought.

Normal Year. The normal year conditions are considered the average for 2017 through 2019.

Single Dry Year. Per historical meteorological data, the driest year on record was 2007. Relative to the previous three years and the following three years, demand in 2007 was 4.8% higher. This spike in demand is applied to projected normal year demand to represent the anticipated response to a similar single-year drought event.

Five-Consecutive-Year Drought. Per historical meteorological data, the driest five-year period on record was 2011 to 2015. Using 2010 demand as a baseline and adjusting for population growth, demand varied over the five-year period as shown in Table 7.1.

Table 7.1 – Five-Year Drought Demand Variation from Baseline

Year	Year 1	Year 2	Year 3	Year 4	Year 5
Percent Increase from Baseline	2.2%	8.2%	12.4%	11.8%	3.2%

7.2.3 – Water Service Reliability

> *Water Code Section 10635(a)*
>
> *Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.*

7.2.3.1 – Description of Management Tools and Options

> *Water Code Section 10620(f)*
>
> *An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.*

The City utilizes the following water management tools and options:

- Water Conservation Program
- Leak Detection
- Water Audits
- Ordinance for water use efficient fixtures in new construction
- Conversion of potable water irrigation demand to reclaimed water

7.2.3.2 – Normal Year Supply Reliability

The average demand for 2017 through 2019 has been projected through 2045 accounting for population growth, response to wholesale cost increase, response to water efficiency building code requirements, and conversion for potable water use for irrigation to reclaimed water at a rate of 350 AFY every five years.

Table 7.2 provides a summary of the normal year demand projection.

Table 7.2 – Summary of Normal Year Demand Projection

Sector	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Residential Single Family	18,839	18,996	19,180	19,327	19,427
Residential Multi Family	2,523	2,544	2,569	2,589	2,602
Commercial/ Institutional	3,078	3,104	3,134	3,158	3,174
Industrial	1,044	1,053	1,063	1,071	1,077
Landscape	2,876	2,526	2,176	1,826	1,476
Hydrants	200	200	200	200	200
Sales to Other Agencies	200	200	200	200	200
Brine Discharge	2,000	2,000	2,000	2,000	2,000
Real & Apparent Losses	2,000	2,000	2,000	2,000	2,000
Reclaimed Water	4,795	5,145	5,495	5,845	6,195
Total Water Use	37,555	37,768	38,017	38,216	38,351

Table 7.3 provides a summary of the normal year supply and demand comparison.

Table 7.3 – Normal Year Supply and Demand Comparison

Year	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Projected Normal Year Supply	46,222	46,222	46,222	46,222	46,222
Projected Normal Year Demand	37,555	37,768	38,017	38,216	38,351
Surplus	8,667	8,454	8,205	8,006	7,871

There is adequate supply under normal years to meet demand through 2045.

7.2.3.3 – Single Dry Year Supply Reliability

Projected single dry year demand is the projected normal dry year demand increase by 4.8%.

Table 7.4 provides a summary of the single dry year demand projection.

Table 7.4 – Summary of Single Dry Year Demand Projection

Year	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Projected Single Dry Year Demand	39,358	39,581	39,842	40,051	40,192

Table 7.5 provides a summary of the single dry year supply and demand comparison.

Table 7.5 – Single Dry Year Supply and Demand Comparison

Year	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Projected Normal Year Supply	46,222	46,222	46,222	46,222	46,222
Projected Normal Year Demand	39,358	39581	39,842	40,051	40,192
Surplus	6,864	6,641	6,380	6,171	6,030

There is adequate supply during a single dry year to meet demand through 2045.

7.2.3.4 – Five Consecutive Dry Years Supply Reliability

Projected five consecutive dry year demand is the projected normal dry year demand increase by 2.2% in Year 1, 8.2% in Year 2, 12.4% in Year 3, 11.8% in Year 4, and 3.2% in Year 5.

Table 7.6 provides a summary of the five consecutive dry years demand projection.

Table 7.6 – Summary of Five Consecutive Dry Years Demand Projection

Five Consecutive Dry Years	2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Year 1	38,382	38,599	38,854	39,057	39,195
Year 2	40,635	40,865	41,135	41,350	41,496
Year 3	42,212	42,452	42,731	42,955	43,107
Year 4	41,987	42,225	42,503	42,726	42,877
Year 5	38,757	38,977	39,234	39,439	39,579

Table 7.7 provides a summary of the single dry year supply and demand comparison.

Table 7.7 – Five Consecutive Dry Years Supply and Demand Comparison

Year		2025 (AFY)	2030 (AFY)	2035 (AFY)	2040 (AFY)	2045 (AFY)
Year 1	Supply	46,222	46,222	46,222	46,222	46,222
	Demand	38,382	38,599	38,854	39,057	39,195
	Surplus	7,840	7,623	7,368	7,165	7,027
Year 2	Supply	46,222	46,222	46,222	46,222	46,222
	Demand	40,635	40,865	41,135	41,350	41,496
	Surplus	5,587	5,357	5,087	4,872	4,726
Year 3	Supply	46,222	46,222	46,222	46,222	46,222
	Demand	42,212	42,452	42,731	42,955	43,107
	Surplus	4,010	3,770	3,491	3,267	3,115
Year 4	Supply	46,222	46,222	46,222	46,222	46,222
	Demand	41,987	42,225	42,503	42,726	42,877
	Surplus	4,235	3,997	3,719	3,496	3,345
Year 5	Supply	46,222	46,222	46,222	46,222	46,222
	Demand	38,757	38,977	39,234	39,439	39,579
	Surplus	7,465	7,245	6,988	6,783	6,643

There is adequate supply during five consecutive dry years to meet demand through 2045.

7.3 – Drought Risk Assessment

Water Code Section 10635(b)

Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.

7.3.1 – Data, Methods, and Basis for Water Shortage Condition

The driest consecutive five years on record are 2011 through 2015. Over that period, demand increased from a baseline as shown in Table 7.1.

For purposes of the Drought Risk Assessment (DRA), the baseline is considered the demand in 2020.

7.3.2 – DRA Water Source Reliability

There are no constraints on imported water supply.

The demand for reclaimed water is limited by the extent of the reclaimed water distribution system. For purposes of the DRA, reclaimed water demand is capped at 4,445 AFY, the average reclaimed water demand for 2017 through 2019. Although there is reclaimed water supply in excess of 10,000 AFY, direct use is limited by the customers connected to the system.

Groundwater production from the Temescal Basin is limited to the estimated future production at 21,725 AFY.

Groundwater from the Bedford-Coldwater Basin does not meet water quality standards and is not in use. This source is not available for the next five years.

7.3.3 – Total Water Supply and Use Comparison

Under the conditions described above, the Drought Risk Assessment is provided in Table 7.8.

Table 7.8 – Drought Risk Assessment

Year	2021 (AFY)	2022 (AFY)	2023 (AFY)	2024 (AFY)	2025 (AFY)
Supply	47,280	47,280	47,280	47,280	47,280
Demand	38,858	41,140	42,737	42,509	39,239
Surplus	8,422	6,140	4,543	4,771	8,041

There is adequate supply during five consecutive dry years beginning in 2021.

Chapter 8 – Water Shortage Contingency Planning

8.1 – General Description

Water Shortage Contingency Planning deals with the City's authority to impose water use constraints on end users in order to assure sustainability under stressful emergency and long-term water shortage conditions.

Ordinance No. 2962 (2009) was enacted as an amendment to the Corona Municipal Code related to water conservation. This ordinance is cited throughout this chapter in italics print and are provided in Appendix R.

8.2 – Water Supply Reliability Analysis

> *Water Code Section 10632(a)(1)*
>
> *The analysis of water supply reliability conducted pursuant to Section 10635.*

Refer to Chapter 7 for the water supply reliability analysis.

8.3 – Annual Water Supply and Demand Assessment Procedures

Water Code Section 10632(a)(2)

The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision-making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

Water Code Section 10632.1.

An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

8.3.1 – Supply Assessment Procedure

Total supply is considered the sum of imported water, groundwater from the Temescal Basin, groundwater from the Bedford-Coldwater Basin, and reclaimed water.

For this 2020 UWMP, the available supply for each of these sources is shown in Table 8.1.

Table 8.1 – Supply Baseline

Source	Supply (AFY)
Imported Water	21,110
Temescal Basin	13,000
Bedford-Coldwater Basin	2,112
Reclaimed Water	10,000
Total	46,222

8.4 – Six Standard Water Shortage Levels

Water Code Section 10632(a)(3)

(A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.

In the event of a supply shortage, the General Manager will determine the shortage level based on available supply and the correspondence supply deficit as shown in Table 8.2. For planning purposes, demand is assumed to be 38,351 AFY, the projected Normal Year demand in 2045.

Table 8.2 – Shortage Level Determination

WSCP Stage	Ordinance 2962 Water Conservation Stage	Condition	Available Supply (AFY)	Deficit (AFY)
0	1	No Shortage	46,222	None
1	1	10% Shortage	41,600	None
2	2	20% Shortage	36,978	1,373
3	2	30% Shortage	32,355	5,996
4	3	40% Shortage	27,733	10,618
5	4	50% Shortage	23,111	15,240
6	5	More than 50%	Less than 23,111	More than 15,240

Per Ordinance 2962, a water shortage may be caused by, but is not limited to, any or all of the following circumstances or events:

> *(1) a regional or statewide water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring persons to reduce water use;*
>
> *(2) groundwater wells are inoperable or unusable (such as by power outages, mechanical failure, or contamination);*
>
> *(3) alternative water supplies are limited or unavailable;*
>
> *(4) groundwater levels or groundwater quality is approaching levels which may require augmentation of the groundwater basin or other actions necessary to protect the groundwater basin as prescribed by the California Department of Water Resources, California Department of Public Health, the Regional Water Quality Control Board, Riverside County, or some other regulatory body; and*
>
> *(5) a major failure of any supply or distribution facility, whether temporary or permanent, occurs in the water distribution system of the State, the Metropolitan Water District of Southern California, the Western Municipal Water District, or city water facilities.*

8.5 – Shortage Response Actions

> *Water Code Section 10632 (a)(4)*
>
> *Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:*
>
> *(A) Locally appropriate supply augmentation actions.*
>
> *(B) Locally appropriate demand reduction actions to adequately respond to shortages.*
>
> *(C) Locally appropriate operational changes.*
>
> *(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.*
>
> *(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.*

The subsection that follow were taken from Ordinance 2962.

8.5.1 – Water Conservation Stage 1 (No Shortage)

Water Conservation Stage 1 is also referred to as a "Normal Water Supply" and applies during periods when the city is able to meet all of the water demands of its customers. Water Conservation Stage 1 is in effect at all times unless the City Council otherwise declares that another water conservation stage is in effect pursuant to this chapter 13.26. Water is a limited natural resource and must be used efficiently and economically to meet the health and safety needs of the community. All normal water efficiency programs and water conservation regulations of the city, including the city's landscape design guidelines for commercial and industrial developments as may be adopted from time to time, will be in full force and effect during Water Conservation Stage 1.

8.5.2 – Water Conservation Stage 2

The objective of the measures undertaken in Water Conservation Stage 2 is to reduce water system consumption within the city by ten to fifteen percent as determined and recommended by the General Manager.

Except as otherwise provided in this Section 13.26.060, all water conservation and drought response measures of Water Conservation Stage 1 shall be in full force and effect during Water Conservation Stage 2. Upon declaration of a Water Conservation Stage 2 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

- *The city shall determine the base year consumption amount. Water customers shall reduce their water consumption by ten to fifteen percent, as determined and recommended by the General Manager, from the base year consumption amount for the duration of Water Conservation Stage 2. Provided, however, the base year consumption amount for any subsequent fiscal year shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 2 for more than twelve months.*
- *Lawns and/or ground covers may be watered and landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated days:*
    - *lawns and/or ground cover may be watered and landscaping may be irrigated for properties with odd number street addresses, parks, and the public right-of-ways, only on Saturdays, Mondays, and Wednesdays between the hours of 8:00 p.m. and 10:00 a.m.;*
    - *lawns and/or ground cover may be watered and landscaping may be irrigated for properties with even number street addresses only on Sundays, Tuesdays, and Thursdays between the hours of 8:00 p.m. and 10:00 a.m.; and*
    - *watering lawns and/or ground cover and irrigating landscaping is prohibited on Fridays and on any day of the week outside of the designated watering windows set forth in Section 13.26.060(C)(2)(a) and (b) hereof.*

- *All irrigation timers shall be adjusted to comply with the provisions of Section 13.26.060(C)(2) hereof.*
- *Notwithstanding the provisions of Section 13.26.060(C)(2), the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.*
- *All open hoses shall be equipped with automatic, positive, shut-off nozzles.*
- *All swimming pools, spas, ponds, and fountains shall be equipped with re-circulating pumps.*
- *All plumbing leaks, improperly adjusted sprinklers, or other water conduits/fixtures that require repair or adjustment shall be corrected to the satisfaction of the city.*
- *No person shall use water to wash down sidewalks, driveways, parking areas, tennis courts, patios, or other paved or hard surface areas, except to alleviate immediate fire or sanitation hazards.*
- *No person shall allow water to leave his or her property by drainage onto adjacent properties or public or private roadways or streets due to excessive irrigation and/or uncorrected leaks.*
- *The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment, is permitted at any time with a hand-held bucket or a hand-held hose equipped with an automatic, positive, shut-off nozzle for quick rinses. Washing may be done at any time on the immediate premises of a commercial car wash or commercial service station, or by a mobile car wash or on-site car wash using high pressure washing equipment.*
- *Use of water from fire hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain the health, safety, and welfare of the public.*
- *All restaurants are prohibited from serving water to their patrons except when specifically requested by the patrons.*
- *Construction operations receiving water from a construction meter or water truck shall not use water unnecessarily for any purpose other than those required by regulatory agencies. Construction projects requiring watering for new landscaping materials shall adhere to the designated irrigation requirements set forth in Section 13.26.060(C)(2) hereof.*

8.5.3 – Water Conservation Stage 3

The objective of the measures undertaken in Water Conservation Stage 3 is to reduce water system consumption within the city by sixteen to twenty percent as determined and recommended by the General Manager.

Except as otherwise provided in this Section 13.26.070, all water conservation and drought response measures of Water Conservation Stages 1 and 2 shall be in full force and effect during Water Conservation Stage 3. Upon declaration of a Water Conservation Stage 3 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

- *Water customers shall reduce their water consumption by sixteen to twenty percent, as determined and recommended by the General Manager, from the base year consumption amount for the duration of Water Conservation Stage 3. Provided, however, the base year consumption amount for any subsequent fiscal year shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 3 for more than twelve months.*
- *Lawns and/or ground cover may be watered and landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated days:*
    - *lawns and/or ground cover may be watered and landscaping may be irrigated for properties with odd number street addresses, parks, and public right-of-ways, only on Saturdays and Wednesdays between the hours of 8:00 p.m. and 10:00 a.m.:*
    - *lawns and/or ground cover may be watered and landscaping may be irrigated for properties with even number street addresses only on Sundays and Thursdays between the hours of 8:00 p.m. and 10:00 a.m.; and*
    - *watering lawns and/or ground cover and irrigating landscaping is prohibited on Mondays, Tuesdays and Fridays and on any day of the week outside of the designated water windows set forth in Section 12.26.070(C)(2)(a) and (b) hereof.*
- *Notwithstanding the provisions of Section 13.26.070(C)(2) hereof, the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.*
- *Irrigation timers shall be adjusted to comply with the provisions of Section 13.26.070(C)(2) hereof.*
- *The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is permitted only during the hours of 9:00 a.m. to 6:00 p.m. on Saturdays, Sundays, and Mondays with a hand-held bucket or a hand-held hose*

equipped with an automatic, positive, shut-off nozzle for quick rinses. Washing is permitted at any time on the immediate premises of a commercial car wash. The use of water by all types of commercial car washes not using partially reclaimed or recycled water shall be reduced in volume by an amount determined by the City Council. Further, such washings are exempt from these regulations where the health, safety, and welfare of the public is contingent upon frequent vehicle cleanings, such as garbage trucks and vehicles used to transport food and perishables.

- *The overfilling of swimming pools and spas is prohibited. The filling or refilling of ponds, streams, and artificial lakes is prohibited.*
- *The operation of any ornamental fountain or similar structure is prohibited except for short periods of time to prevent damage.*
- *The number of new construction meters shall not exceed the number of currently authorized meters removed from service. A new meter shall be issued only when an old meter is returned. Construction projects requiring water from a construction meter or a water truck shall not use water unnecessarily for any purposes other than those required by regulatory agencies. Construction projects requiring water for new landscapes shall adhere to the designated days and watering windows as set forth in Section 13.26.070(C)(2) hereof. Further, construction projects necessary to maintain the health, safety, and welfare of the public, as determined by the city, are exempt from these regulations.*

8.5.4 – Water Conservation Stage 4

The objective of the measures undertaken in Water Conservation Stage 4 is to reduce water consumption within the city by twenty-one to forty percent as determined and recommended by the General Manager.

Except as otherwise provided in this Section 13.26.080, all water conservation and drought response measures of Water Conservation Stages 1, 2, and 3 shall be in full force and effect during Water Conservation Stage 4. Upon declaration of a Water Conservation Stage 4 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

- *Water customers shall reduce their water consumption by twenty to forty percent from the base year consumption amount for the duration of the Water Conservation Stage 4. Provided, however, the base year consumption amount for subsequent 12 fiscal years shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 4 for more than twelve months.*
- *Irrigation of landscaping shall be limited to supporting minimal survival of trees and shrubs. Landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated day:*
    - *properties with odd number street addresses, parks, and public right of ways may irrigate landscaping only on Saturdays between the hours of 8:00 p.m. and 10:00 a.m.;*
    - *properties with even number street addresses may irrigate landscaping and pastures only on Sundays between the hours of 8:00 p.m. and 10:00 a.m.; and*
    - *irrigating landscaping is prohibited on Mondays, Tuesdays, Wednesdays, Thursdays, and Fridays and outside the designated watering windows set forth in Section 13.26.080(C)(2)(a) and (b).*
- *Notwithstanding the provisions of Section 13.26.080(C) hereof, the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.*
- *All outdoor watering and irrigation of lawns and ground covers is prohibited with the exception of plant materials classified and determined by the City Manager to be rare, exceptionally valuable, or essential to the well being of the public at large or rare animals, and for which relief has been otherwise granted pursuant to Section 13.26.150.*
- *The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is prohibited. Washing is permitted at any time on the immediate premises of a commercial car wash. Commercial car washes shall only use partially reclaimed or recycled water for washing automobiles, trucks, trailers,*

boats, airplanes and other types of mobile equipment. Further, such washings are exempt from these regulations where the health, safety and welfare of the public is contingent upon frequent vehicle cleanings, such as garbage trucks and vehicles used to transport food and perishables.

- *The filling, refilling, or adding of water to swimming pools, spas, ponds, streams, and artificial lakes is prohibited.*
- *The operation of any ornamental fountain, pond, or similar structure is prohibited except for short periods of time to prevent damage.*
- *The use of water for cooling mists is prohibited.*
- *The use of water for commercial, manufacturing, or processing purposes shall be reduced in volume by an amount determined by the City Council and/or as recommended by the General Manager.*
- *No new construction meters will be issued. Construction water shall not be used for earth work, road construction purposes, dust control, compaction, or trenching jetting. Construction projects necessary to maintaining the health, safety, and welfare of the public, as determined by the city, are exempt from these regulations.*
- *Provided the City Council has declared a water shortage emergency pursuant to California Water Code sections 350 et seq., except as to property for which a building permit has been heretofore issued, no new building permit(s) shall be provided, except in the following circumstances:*
    - *for projects necessary to protect the public's health, safety, and welfare, as determined by the city;*
    - *when using recycled water;*
    - *when the recipient of the building permit can demonstrate that no net increase in water use will occur; or*
    - *where the recipient of the building permit provides a conservation offset. A conservation offset may be effected by paying a fee established by the city in an amount necessary to cover the cost of implementing conservation techniques or acquiring alternative water sources. The fee will be based on the conservation offset required for an equivalent dwelling unit. Such fee shall apply to residential as well as commercial and industrial buildings, and may be adjusted from time to time as determined by the city.*

8.5.5 – Water Conservation Stage 5

The objective of the measures undertaken in Water Conservation Stage 5 is to reduce water consumption by forty percent or more as determined and recommended by the General Manager.

Except as otherwise provided in this Section 13.26.090, all water conservation and drought response measures of Water Conservation Stages 1, 2, 3, and 4 shall be in full force and effect during Water Conservation Stage 5. Upon declaration of a Water Conservation Stage 5 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

- *Water customers shall reduce their water consumption by forty-one percent or more from the base year consumption amount for the duration of Water Conservation Stage 5. Provided, however, the base year consumption amount for subsequent fiscal years shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 5 for more than twelve months.*
- *All outdoor watering and irrigation of lawns and ground cover, and landscaping is prohibited, with the exception of the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs, which is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.*
- *Provided the City Council has declared a water shortage emergency pursuant to California Water Code sections 350 et seq., the city shall not allow any new connections to the water system during Water Conservation Stage 5.*

8.5.6 – Emergency Response Plan

The City is preparing an emergency response plan per the America's Water Infrastructure Act of 2018.

8.5.7 – Seismic Risk Assessment and Mitigation Plan

> *Water Code Section 10632.5.(a)*
>
> *In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.*
>
> *(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.*
>
> *(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.*

The City addresses seismic risk and vulnerability through the City of Corona Local Hazard Mitigation Plan (LHMP) and through the Riverside County Operational Area Multi-Jurisdictional Local Hazard Mitigation Plan (MJLHMP), included in Appendix S.

The latest version of the LHMP was prepared in 2017 and identifies hazards, reviews and assesses past disaster occurrences, estimates the probability of future occurrences, and sets goals to mitigate potential risks.

Regarding earthquake risk, the LHMP states the following:

> *The City of Corona is considered to be seismically active, as is most of Southern California. Several known active or potentially active faults are located in and around Corona. The Elsinore Fault zone is the closest major fault system to the City and one of the largest in Southern California. Historically, the Elsinore Fault zone has also been one of the least active systems. At its northern end, near the City, the Elsinore Fault zone splays into two segments, the Chino-Central Avenue Fault and the Whittier Fault. Along the southwestern portion of the City the Elsinore Fault zone is referred to as the Glen Ivy Fault…*
>
> *Ground surface rupture due to active faulting is considered possible in the western portion of the City where known active or potentially active faults are mapped. Geological evidence indicates that the Glen Ivy and portions of the Whittier Faults are active and that the Chino-central Avenue Fault is potentially active.*
>
> *Historically, the Corona region has generally been spared a major destructive earthquake. However, based on a search of earthquake databases of the USGS National Earthquake Information Center, several major earthquakes (magnitude 6.0 or more) have been recorded within approximately 100 kilometers of the City since 1769. The City's General Plan Public Health and Safety Element have identified various implementation programs with respect to fault rupture and other geologic disturbances. These programs specify various requirements including: detailed geologic investigations are to be conducted in conformance with guidelines of the California Division of Mines and Geology (CDMG), for all construction of transportation infrastructure in an Alquist-Priolo Special Study Zone; construction of essential facilities within 200 feet of an active fault or potentially active fault; and field information is to be developed as part of any CEQA investigations, and*

> *geologic reports by the City and/or County geologists should be kept current and accessible for use in report preparation, geologic reviews, and policy development.*
>
> *Additionally, the City's General Plan Public Health and Safety Element have identified various implementation programs to be carried out by the City and county affecting seismic safety of critical facilities. These programs include: detailed site studies for fault future potential are to be conducted as background to the design process for critical facilities under City and county discretionary approval; existing critical facilities are to be reviewed for any significant siting, design, or construction problems that would make them vulnerable in an earthquake. The findings shall be incorporated into emergency operation plans as well as addressed in longer-term programs of facilities upgrading or relocation unless satisfactorily demonstrated that a building setback from an active or potentially active fault will not adversely impact public health, safety, and welfare. New Essential Facilities shall not be located within 200 feet of an active fault or potentially active fault. (See Riverside County OA MJHMP Section 4.0)*

Several earthquake mitigation projects relating to water supply have been completed since 2012, including evaluation/modification of all above ground steel storage reservoirs for proper venting in the event of an earthquake and installation of emergency generators for three groundwater wells.

8.5.8 – Shortage Response Action Effectiveness

Response effectiveness was estimated during the development of Ordinance 2962, as shown in Table 8.3.

Table 8.3 – Estimate of Shortage Action Effectiveness

Stage	Deficit (AFY)	Response	Reduction (AFY)
1	0	There is no deficit under Stage 1.	0
2	1,373	The City estimates a demand reduction between 10 and 15 percent.	3,835 to 5,753
3	5,996	The City estimates a demand reduction between 10 and 15 percent.	3,835 to 5,753
4	10,618	The City estimates a demand reduction between 16 and 20 percent.	5,753 to 7,670
5	15,240	The City estimates a demand reduction between 21 and 40 percent.	7,670 to 15,340
6	More than 15,240	The City estimates a demand reduction between 21 and 40 percent.	7,670 to 15,340

8.6 – Communication Protocols

Water Code Section 10632 (a)(5)

Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications

The City communicates with its water customers through the City websites and billing inserts.

8.7 – Compliance and Enforcement

Water Code Section 10632 (a)(6)

For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

8.7.1 – Violations and remedies.

It shall be unlawful for any person to willfully violate the provisions of this chapter 13.26. A violation of any of these provisions shall be a misdemeanor subject to imprisonment in the county jail for not more than thirty days or by fine not to exceed $1,000, or by both, as provided in California Water Code section 377.

In addition to any remedies or enforcement measures provided by State law or in this chapter 13.26, any violation of this chapter 13.26 is subject to the provisions of chapters 1.08 and 1.09 of the Corona Municipal code.

In addition to any other remedies provided in this Code or available under applicable law, the city can alternatively seek injunctive relief in the Superior Court or take enforcement action, including discontinuing or appropriately limiting water service to any customer, for violations of this chapter 13.26.

8.7.2 – Notices And Additional Enforcement Measures

In addition to or in conjunction with the notice of violation provided pursuant to the provisions of chapter 1.08, for a first violation of any provision of this chapter 13.26, within two weeks of the violation:

- *the city may send an enforcement officer or provide written notice to the property owner, customer, occupant, or responsible person of the property where the violation occurred to advise such person of:*
    - *the water conservation stage then in effect and the provisions of this chapter 13.26 relating thereto;*
    - *water conservation and drought response measures that are required and may be implemented pursuant to this chapter 13.26;*
    - *possible consequences and actions which may be taken by the city for future violations of this chapter 13.26, including discontinuance of water service;*
    - *penalties that may be imposed for the specific violation and any future violations of this chapter 13.26; and*
- *if the General Manager or his or her designee deems it to be appropriate, the city may order the installation of a flow-restricting device on the service line for any person who violates any term or provision of this chapter 13.26.*

In addition to or in conjunction with the notice of violation provided pursuant to the provisions of chapter 1.08, for a second or any subsequent violation of this chapter 13.26, within two weeks of the violation:

- *the city may send an enforcement officer or provide written notice to the property where the violation occurred to notify the property owner, customer, occupant of the property, or responsible person where the violation occurred to advise such person of:*
    - *the water conservation stage then in effect and the provisions of this chapter 13.26 relating thereto;*
    - *the water conservation and drought response measures that are required and may be implemented by such person; and*
    - *possible consequences, which may occur in the event of any future violations of this chapter 13.26;*
- *if the General Manager or his or her designee deems it to be appropriate, the city may order the installation of a flow-restricting device on the service line for any person who violates any term or provision of this chapter 13.26; and*
- *if the General Manager or his or her designee deems it to be appropriate, the city may discontinue water service at the location where the violation occurred.*

The city may, after one written notice of violation, order that a special meter reading or readings be made in order to ascertain whether wasteful or unreasonable use of water is occurring.

All moneys collected under this Section 13.26.140 shall be deposited in a special account of the city and shall be made available for enforcement of this chapter 13.26.

The city may, at its option, elect to petition the Superior Court to confirm any order establishing administrative penalties and enter judgment in conformity therewith in accordance with the provisions of Sections 1285 to 1287.6, inclusive, of the California Code of Civil Procedure.

8.7.3 – Civil Actions

In addition to any other remedies provided in the Code, any violation of this chapter 13.26 may be enforced by civil action brought by the city.

In any such action, the city may seek, and the court may grant, as appropriate, any or all of the following remedies:

- *a temporary and/or permanent injunction;*
- *assessment of the violator for the costs of any investigation, which led to the establishment of the violation, and for the reasonable costs of preparing and bringing legal action under this Section 13.26.130;*
- *any other costs incurred in enforcing the provisions of this chapter 13.26; and*
- *any other action the city deems appropriate to protect the general welfare and the City's water supplies, and to reduce water consumption in accordance with this chapter 13.26 and the declared policies and laws of the State.*

Assessments under this subsection shall be paid to the city to be used exclusively for costs associated with implementing or enforcing the water conservation and regulatory provisions of this chapter 13.26.

8.7.4 – Recovery of Costs

The General Manager or his or her designee shall serve an invoice for costs upon the person or responsible person who is subject to a notice of violation, a cease and desist order, or an administrative compliance order. An invoice for costs shall be immediately due and payable to the City. If any person or responsible person fails to either pay the invoice for costs or appeal successfully the invoice for costs in accordance with this chapter 13.26, then the City may institute collection proceedings. The invoice for costs may include reasonable attorneys' fees.

The city shall impose any other penalties or regulatory fees, as fixed from time to time by resolution of the City Council, for a violation or enforcement of this chapter 13.26.

In addition to the costs which may be recovered pursuant to Section 1.08.022 of the Code, and in order to recover the costs of the water conservation regulatory program set forth in this chapter 13.26, the City Council may, from time to time, fix and impose by resolution *fees and charges. The fees and charges may include, but are not limited to, fees and charges for:*

- *any visits of a water conservation specialist, enforcement officer, or other city staff for time incurred for meter reading, follow-up visits, or the installation or removal of a flow-restricting device;*
- *monitoring, inspection, and surveillance procedures pertaining to enforcement of this chapter 13.26;*
- *enforcing compliance with any term or provision of this chapter 13.26;*
- *reinitiating service at a property where service has been discontinued pursuant to this chapter 13.26;*
- *processing any fees necessary to carry out the provisions of this chapter 13.26; and*
- *any other necessary and appropriate fees and charges to recover the cost of providing the city's water conservation regulatory program.*

8.7.5 – Relief from Compliance

Consideration of written applications for relief from compliance ("relief") regarding the regulations and restrictions on water use set forth in this chapter 13.26 may be made by the city.

Written applications for relief shall be accepted, and may be granted or denied, by the approving authority at his or her sole discretion. The application shall be in a form prescribed by the city and shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the review proceedings related thereto.

The grounds for granting or conditionally granting an application for relief are:

- *a customer has reduced water usage to the minimum feasible level but cannot reduce usage by the amount required by then-current mandatory water conservation stage declared pursuant to this chapter due to the number of people in the household or medical necessity, where "reduced water usage to the minimum feasible level" shall mean that the customer has installed xeriscaping or other low-water landscaping (or has ceased watering other types of landscaping), high efficiency water-using appliances, water-efficient toilets, water-saving faucet devices, and low-flow shower heads, and is complying in all other respects with the requirements of this chapter; or*
- *due to unique circumstances other than those described in subsection*
- *above, a specific requirement of this chapter 13.26 would result in undue hardship to a person using city water or to property upon which city water is used, that is disproportionate to the impacts to other city water users generally or to similar property or classes of water users; or*

- *failure to grant a relief would adversely affect the health, sanitation, fire protection, or safety of the applicant or the public.*

The application for a relief shall be accompanied, as appropriate, with photographs, maps, drawings, and other information substantiating the applicant's request, including a statement of the applicant. Provided, however, the city may request such other additional information as it deems appropriate in order to process and/or review the application for relief.

An application for a relief shall be denied unless the approving authority finds, based on the information provided in the application, supporting documentation, or such other additional information as may be requested, and on water use information for the property as shown by the records of the city, all of the following:

- *That the relief does not constitute a grant of special privilege inconsistent with the limitations upon other city customers.*
- *That because of special circumstances applicable to the property or its use, comprising any of the circumstances set forth in subsection (B) of this section, the strict application of this chapter 13.26 would have a disproportionate impact on (a) the property or use that exceeds customers generally, or (b) the applicant's health that exceeds customers generally.*
- *That the authorization of such relief will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the city to effectuate the purposes of this chapter 13.26 and will not be detrimental to the public interest.*
- *That the condition or situation of (a) the subject property or the intended use of the property for which the relief is sought is not common, recurrent, or general in nature, or (b) the applicant's health or safety is not common, recurrent, or general in nature.*

The denial or grant of a relief shall be acted upon within fifteen (15) business days of the submittal of the complete application, including any photographs, maps, drawings, and other information substantiating the applicant's request and the statement of the applicant. The application may be approved, conditionally approved, or denied, subject to subsection (G) of this section. The decision of the approving authority shall be prepared in writing, include terms and conditions, if any, set forth findings in support of the decision, and be promptly sent to the applicant.

The denial of a request for a relief may be appealed in writing to the City Manager. An appeal shall be made in accordance with the following procedures:

- *The appellant shall complete and submit in writing a form provided by the city for such purpose and shall state in such form the grounds for his or her appeal. The form shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the proceedings. All appeals shall be submitted to the City Clerk within thirty (30) calendar days of the date of the notice of the denial of the request for a relief.*

- *The City Manager, or his or her designee, shall review the appeal and any related information provided, and, if necessary, cause an investigation and report to be made concerning the request for a relief. The City Manager, or his or her designee, shall have fifteen (15) calendar days from the submission of the appeal to render a decision on whether to grant or deny the appeal and mail notice thereof to the appellant. The decision shall be prepared in writing, include terms and conditions, if any, and set forth findings in support of the decision.*
- *The decision of the City Manager, or his or her designee, may be appealed by the appellant to the City Council. Such appeal must be submitted in writing on the appropriate city form and filed with the City Clerk within fifteen (15) calendar days of the date of decision of the City Manager, or his or her designee. The form shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the proceedings. The City Council shall conduct a hearing on such appeal at its next regularly scheduled City Council meeting; provided, however, the City Council shall have received the notice of appeal at least fifteen (15) calendar days prior to such meeting. If the appeal is not submitted within at least fifteen (15) calendar days prior to a regularly scheduled City Council meeting, then the hearing shall be held at the following regularly scheduled City Council meeting. A notice of the hearing shall be mailed to the appellant at least ten (10) calendar days before the date fixed for the hearing. The City Council shall review the appeal de novo. The determination of the City Council shall be conclusive. Notice of the determination by the City Council shall be mailed to the appellant within ten (10) calendar days of such determination, indicate whether the appeal has been granted in whole or in part, set forth the terms and conditions of the relief, if any, granted to the appellant, and set forth findings in support of the decision. If the appeal is denied in its entirety, the appellant shall comply with all terms and conditions of this chapter 13.26 and the applicable water conservation stage then in effect.*
- *Until the conclusion of the appeal process, all provisions and decisions under appeal shall remain in full force and effect until the conclusion of the appeal process.*

Any grant of a request for relief shall be conditioned upon the continued existence of the facts and circumstances which formed the grounds for granting relief, as provided in this section. The approving authority may revoke any grant of relief if such facts and circumstances are determined no longer to exist.

8.8 – Legal Authorities

Water Code Section 10632 (a)(7)

(A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(B) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1. [see below]

(C) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

Water Code Section Division 1, Section 350

Declaration of water shortage emergency condition. The governing body of a distributor of a public water supply, whether publicly or privately owned and including a mutual water company, shall declare a water shortage emergency condition to prevail within the area served by such distributor whenever it finds and determines that the ordinary demands and requirements of water consumers cannot be satisfied without depleting the water supply of the distributor to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

Per Ordinance 2962:

> *WHEREAS, California Constitution article X, section 2 and California Water Code section 100 provide that because of conditions prevailing in the state of California (the "State"), it is the declared policy of the State that the general welfare requires that the water resources of the State shall be put to beneficial use to the fullest extent of which they are capable, the waste or unreasonable use of water shall be prevented, and the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and the public welfare; and*
>
> *WHEREAS, pursuant to California Water Code section 106, it is the declared policy of the State that the use of water for domestic use is the highest use of water and that the next highest use is for irrigation; and*
>
> *WHEREAS, pursuant to California Water Code section 375, the City of Corona (the "City") is authorized to adopt and enforce a water conservation program to reduce the quantity of water used by persons within its jurisdiction for the purpose of conserving the water supplies of the City; and*
>
> *WHEREAS, on June 4, 2008, the Governor of the State proclaimed a condition of statewide drought and strongly encouraged local agencies to take aggressive, immediate action to reduce water consumption locally and regionally for the remainder of 2008 and prepare for potentially worsening conditions in 2009; and*
>
> *WHEREAS, because of the prevailing conditions in the State, the current statewide drought, and the declared policy of the State, the City hereby finds and determines that it is necessary and appropriate for the City to adopt, implement, and enforce a water*

conservation program to reduce the quantity of water used by consumers within the City to ensure that there is sufficient water for human consumption, sanitation, and fire protection; and

WHEREAS, pursuant to California Water Code section 350 the City Council is authorized to declare a water shortage emergency to prevail within its jurisdiction when it finds and determines that the City will not be able to or cannot satisfy the ordinary demands and requirements of water consumers without depleting the water supply of the City to the extent that there would be insufficient water for human consumption, sanitation, and fire protection, and as more fully set forth in this chapter; and

WHEREAS, in the event the City determines that it is necessary to declare that a water shortage emergency exists, the City will be authorized pursuant to this chapter to implement certain drought response measures and a water conservation and regulatory program to regulate water consumption activities within the City and ensure that the water delivered in the City is put to beneficial use for the greatest public benefit, with particular regard to domestic use, including human consumption, sanitation, and fire protection, and that the waste or unreasonable use of water is prevented; and

WHEREAS, the City is authorized to prescribe and define by ordinance restrictions, prohibitions, and exclusions for the use of water during a threatened or existing water shortage and adopt and enforce a water conservation and regulatory program to: (i) prohibit the wastage of City water or the use of City water during such period; (ii) prohibit use of water during such periods for specific uses which the City may from time to time find nonessential; and (iii) reduce and restrict the quantity of water used by those persons within the City for the purpose of conserving the water supplies of the City; and

WHEREAS, the City hereby finds and determines that pursuant to the provisions of title 13, chapter 13.26 of the City of Corona Municipal Code, as hereby amended, the City shall: (i) implement water conservation and drought response measures; (i) regulate the water consumption activities of persons within the City for the purposes of conserving and protecting the City's water supplies, reducing the quantity of water consumed, and deterring and preventing the waste or unreasonable use or unreasonable method of use of valuable water resources; and (ii) establish and collect regulatory fees and impose fines and penalties as set forth herein to accomplish these purposes and recover the costs of the City's water conservation and regulatory program; and

WHEREAS, the City Council hereby finds and determines that it is desirable to codify the rules and regulations governing its actions, and the actions of persons using and consuming water within the City, particularly during declared water shortages and water shortage emergencies, to protect the general welfare and the City's water supplies, and to reduce water consumption in accordance with the declared policies and laws of the State.

8.9 – Financial Consequences of WSCP

> *Water Code Section 10632(a)(8)*
>
> *A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:*
>
> *(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).*
>
> *(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).*
>
> *(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.*

The City has authority to set its own rates in response to a water shortage. No financial consequences are anticipated.

8.10 – Monitoring and Reporting

> *Water Code Section 10632(a)(9)*
>
> *For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.*

The City monitors production and consumption on a monthly basis.

8.11 – WSCP Refinement Procedures

> *Water Code Section 10632 (a)(10)*
>
> *Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.*

The City reevaluates its WSCP procedures every five years when the UWMP is updated.

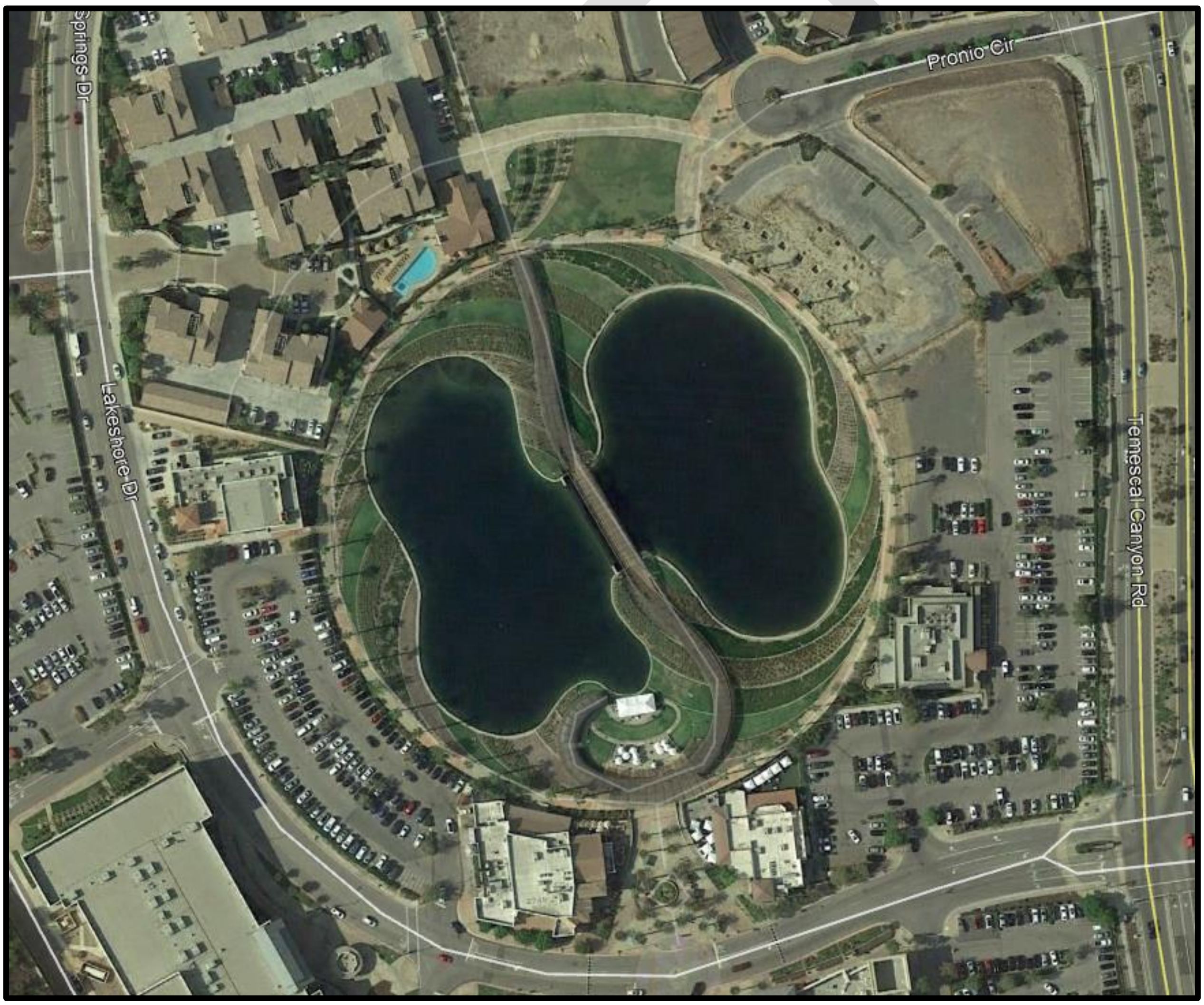
8.12 – *Special* Water Feature Distinction

> *Water Code Section 10632 (b)*
>
> *For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.*

8.12.1 – Dos Lagos

Figure 8.1 is an aerial photograph of the water features at the Dos Lagos commercial center.

Figure 8.1 – Water Features at Dos Lagos



Water features at the Dos Lagos commercial center are supplied by reclaimed water. No additional action is required under a water shortage.

8.12.2 – Border Lake

Figure 8.2 is an aerial photograph of Border Lake.

Figure 8.2 – Water Features at Border Lake

Border Lake is supplied by a private well and is not under the jurisdiction of the City. No additional action is required under a water shortage.

8.12.3 – Eagle Glen Golf Course

Figure 8.3 is an aerial photograph of the water features at the Eagle Glen Gold Course.

Figure 8.3 – Water Features at Eagle Glen Golf Course

Water features at the Eagle Glen Golf Course are supplied by reclaimed water. No additional action is required under a water shortage.

8.13 – Plan Adoption, Submittal, and Availability

> *Water Code Section 10632 (a)(c)*
>
> *The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.*

The WSCP will be provided to Riverside County within 30 days of adoption.

Chapter 9 – Demand Management Measures

9.1 – General Description

Demand Management Measures (DMMs) are established methods and practices for water use reduction. DWR requires implementation of all DMMs through a coordinated effort at the wholesale and retail levels. However, DWR acknowledges that there may be local influences on the viability of individual DMMs and makes allowances for non-implementation.

9.2 – Existing Demand Management Measures for Retail Suppliers

Water Code Section 10631

(e)Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

Per Ordinance 2962:

> *Subject to available funds, the City Manager, or his or her designee, is authorized to develop, promote, and administer water conservation programs to encourage and assist persons in conserving water. The water conservation programs may include, but are not limited to, the following:*
>
> - *installing, or providing rebate programs for the installation of, water saving devices and irrigation systems in the landscaped areas of residential, commercial, industrial, and public property and public rights-of-way;*

- *replacing landscaping and turf with drought tolerant plant material and water efficient landscaping;*
- *developing educational programs to promote water conservation; and*
- *converting, where financially and technically feasible, potable water distribution systems to recycled water distribution systems for landscaped areas of residential, commercial, industrial, and public property and public rights-of way.*

The City Manager shall prepare and implement policies and procedures governing any water conservation program established pursuant to this Section 13.26.160.

The City Manager is authorized to enter into agreements relating to such water conservation programs, provided such agreements are approved as to form by the City Attorney.

The expenditure of funds for any water conservation program shall be subject to the provisions of Chapter 3.08, as applicable, and any other provisions of the Municipal Code restricting the expenditure of city funds.

9.2.1 – Water Waste Prevention Ordinances

Ordinance 2962 specifies waste water prevention as noted in Section 8.5.

9.2.2 – Metering

Water Code Section 526 (a)

Notwithstanding any other provisions of law, an urban water supplier that, on or after January 1, 2004, receives water from the federal Central Valley Project under a water service contract or subcontract... shall do both of the following:

(1*) On or before January 1, 2013, install water meters on all service connections to residential and nonagricultural commercial buildings... located within its service area.*

Water Code section 527

(a) An urban water supplier that is not subject to Section 526 shall do both the following:

(1) Install water meters on all municipal and industrial service connections located within its service area on or before January 1, 2025.

The water system is fully metered.

9.2.3 – Conservation Pricing

The City instituted conservation pricing in 2010.

9.2.4 – Public Education and Outreach

9.2.4.1 – Water Facility Tours

The City of Corona Department of Water and Power offers free water facility tours for residents, businesses and students.

9.2.4.2 – Landscaping Classes

The City of Corona Department of Water and Power offers free landscaping classes to residents.

9.2.4.3 – Water Use Efficiency Grant for Educators

The City of Corona Department of Water and Power offers a Water Use Efficiency Grant, up to $5,000 per project for each school year, for projects that relate to water including, but not limited to, water use efficiency, water quality, water distribution, and water reclamation. There is limited funding set aside for this program so educators are encouraged to apply as soon as possible.

9.2.4.4 – Free Water Education Programs

The City of Corona Department of Water and Power has partnered with the Riverside - Corona Resource Conservation District (RCRCD) to offer free classroom presentations and materials about water. On behalf of the City, a Resource Educator from RCRCD will visit a school to conduct a hands-on classroom program that demonstrates water concepts and helps students learn about using water with care.

The presentation answers the following questions:

- What is the water cycle?
- What is a watershed, a waterway, and an underground water basin?
- Where does Corona get its water?
- What are storm water pollutants?

Students will learn simple ways to:

- conserve water in and around a home, and
- reduce the amount of pollutants that enter our storm drain system and waterways, including washes, creeks, arroyos and ultimately the Santa Ana River.

Educating students about these concepts helps to ensure that future generations will understand the importance of water as a vital resource and form lifelong habits that ensure its responsible use and care.

9.2.4.5 – Annual "Water is Life" Poster Contest

The City of Corona Department of Water and Power sponsors an annual “Water is Life” Poster Contest. The contest is open to all students in the DWP service area. The purpose of the poster contest is to spread the message that water is a precious resource.

9.2.5 – Programs to Assess and Manage Distribution System Real Loss

The City conducts annual Water Audits to assess water loss.

The City manages a leak detection program.

9.2.6 – Water Conservation Program Coordination and Staffing Support

The water conservation program is coordinated through Department of Water and Power.

9.2.7 – Other Demand Management Measures

9.2.7.1 – Urinal Flush Valve Upgrades + Installation

The City of Corona Department of Water and Power is working with Western Municipal Water District to offer free high-quality urinal flush valve upgrades for qualifying sites. The device is free. Installation of new flush valves and the recycling of the old flush valves are also at NO COST to you. Each valve and installation retails for over $200.

9.2.7.2 – WRCOG Financing Programs

The Western Riverside Council of Governments (WRCOG), in partnership with SAMAS Capital, has developed a financing program that allows businesses in Western Riverside County to implement energy and water efficiency improvements using low-interest loans that will be repaid over time through annual property tax payments.

9.2.7.3 – Discounts

The City of Corona Department of Water and Power has teamed up with local businesses to provide water-efficient sprinkler nozzles and smart irrigation controllers at discounted rates of between 10% to 50% off.

9.2.7.4 – Residential and Commercial Turf Replacement

The City of Corona Department of Water and Power turf replacement program has migrated to www.SoCalWaterSmart.com. Applications will be accepted until funds are exhausted.

9.2.7.5 – Pool Cover Rebate

The City of Corona Department of Water and Power has partnered with Western Municipal Water District to offer up to a $50 rebate on pool covers.

9.2.7.6 – Recirculating Pump Rebate

The City of Corona Department of Water and Power is offering a $50 rebate on newly installed recirculating hot water systems.

9.2.7.7 – Commercial Water-Efficient Device Rebates

Rebate reservations for commercial customers are available online on the SoCal Water Smart website. Funding for this program is limited and commercial customers are encouraged to obtain a reservation as soon as possible. For program terms and conditions, as well as a list of eligible devices, commercial customers should visit the SoCal Water Smart website.

Plumbing Devices

- Premium High Efficiency Toilet (Tank Style - 1.1 gpf or less)
- Multi-Family High Efficiency Toilet (5 Unit Dwelling or more - 1.1 gpf or less)
- Commercial High Efficiency Toilet (Flushometer Style - 1.1 gpf or less)
- Plumbing Flow Control Valve
- Ultra Low and Zero Water Urinal (ULWU)

Food Equipment

- Air-Cooled Ice-Making Machine
- Connectionless Food Steamer
- Medical and Dental Equipment
- Dry Vacuum Pump
- Laminar Flow Restrictors

HVAC Equipment

- Cooling Tower Conductivity Controller (CTCC)
- Cooling Tower pH Controller (pH-CTC)

Landscaping Equipment

- Soil Moisture Sensor Systems
- Weather-Based Irrigation Controller (WBIC)
- Irrigation Controller (CCIC)
- Rotating Nozzles for Pop-Up Spray Head Retrofits
- Large Rotary Nozzle
- In-stem Flow Regulators

9.2.7.8 – Residential Water-Efficient Device Rebates

Residential customers are eligible for water efficient device rebates via the SoCal Water Smart website. Funding for this program is limited. For program terms and conditions, as well as a list of eligible devices, residential customers should visit the SoCal Water Smart website.

Eligible Devices

- High-Efficiency Clothes Washer (HECW)
- Premium High-Efficiency Toilets (PHET)
- Weather-Based Irrigation Controller (WBIC)
- Weather-Based Irrigation Controller Large Landscape (WBICLL)
- Soil Moisture Sensor
- Rotating Nozzles
- Rain Barrels

9.3 – Implementation over the Past Five Years

> *Water Code Section 10631*
>
> *(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:*
>
> *(1)(A) …a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.*

See Appendix U.

9.4 – Implementation to Achieve Water Use Targets

> *Water Code Section 10631*
>
> *(f)(1)(A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.*

The City has achieved its 2020 water use target, per SB X7-7.

Chapter 10 – Plan Adoption, Submittal, and Implementation

10.1 – General Description

Plan Adoption, Submittal, and Implementation describe the steps taken to adopt and submit the UWMP and to make it publicly available. This chapter also includes a discussion of the implementation plan

10.2 – Inclusion of All 2020 Data

The City included all required data for calendar year 2020.

10.3 – Notice of Public Hearing

10.3.1 – Notice to Cities and Counties

Water Code Section 10621

(b) Every urban water supplier required to prepare a plan shall…at least 60 days prior to the public hearing on the plan…notify any city or county within which the supplier provides waters supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.

Water Code Section 10642

…The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area…

The City issued a notice to Riverside County more than 60 days prior to the public hearing. See Appendix D.

10.3.2 – Notice to the Public

Water Code Section 10642

…Prior to adopting either [the plan or water shortage contingency plan], the urban water supplier shall make both of the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code [see below]. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies.

Government Code section 6066

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

Notice was provided to the public in advance of the public hearing. See Appendix M for documentation on the notice.

10.4 – Public Hearing and Adoption

Water Code Section 10642

…Prior to adopting either [the plan or water shortage contingency plan], the urban water supplier shall make both of the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code [see below]. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies.

Government Code section 6066

Publication of notice pursuant to this section shall be once a week for two successive weeks. Two publications in a newspaper published once a week or oftener, with at least five days intervening between the respective publication dates not counting such publication dates, are sufficient. The period of notice commences upon the first day of publication and terminates at the end of the fourteenth day, including therein the first day.

10.4.1 – Public Hearing

A public hearing was held June 16, 2021.

10.4.2 – Adoption

> *Water Code Section 10642*
>
> *…After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing.*

The plan was adopted June 16, 2021. See Appendix N for the Resolution of Adoption.

10.5 – Plan Submittal

> *Water Code Section 10621*
>
> *(e) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021…*
>
> *Water Code Section 10644*
>
> *(a)(1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.*
>
> *Water Code Section 10635*
>
> *(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.*

The plan will be submitted to the State Library and the Department of Water Resources within 30 days of adoption. A copy of the plan will be provided to Riverside County within 60 days of submission.

10.5.1 – Electronic Data Submittal

> *Water Code Section 10644 (a)(2)*
>
> *The plan, or amendments to the plan, submitted to the department … shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.*

The plan will be submitted to the Department of Water Resources Water Use Efficiency Portal within 30 days of adoption.

10.6 – Public Availability

> *Water Code Section 10645*
>
> *(a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.*
>
> *(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.*

The plan will be made available to the public via the City website and a hard copy will be made available at the City during normal business hours.

10.7 – Amending an Adopted UWMP or Water Shortage Contingency Plan

> *Water Code Section 10621*
>
> *(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).*
>
> *Water Code Section 10644*
>
> *(a)(1) Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.*

10.7.1 – Amending a UWMP

In the event the 2020 UWMP is amended following adoption, the City will comply with all requirements regarding the amendment process.

10.7.2 – Amending a Water Shortage Contingency Plan

> *Water Code Section 10644 (b)*
>
> *If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared…no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.*

In the event the WSCP is amended following adoption, the City will comply with all requirements regarding the amendment process.

CITY OF CORONA

2020 URBAN WATER MANAGEMENT PLAN

VOLUME 2 – DRAFT APPENDICES

June 2021

Prepared by

Michael Baker INTERNATIONAL

CITY OF CORONA

2020 URBAN WATER MANAGEMENT PLAN

VOLUME 2 – DRAFT APPENDICES

June 2021

PREPARED FOR

CITY OF CORONA
400 SOUTH VICENTIA AVENUE
CORONA, CA 92882

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This volume is intended to accompany Volume 1 of the City of Corona 2020 Urban Water Management Plan (UWMP). Its purpose is to provide reference material cited in the UWMP as mandated by the California Urban Water Management Planning Act or in support thereof.

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Appendix B – California Water Code – Urban Water Management Planning

Appendix C – California Water Code – Sustainable Water Use and Demand Reduction (SB X7-7)

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Appendix U – Documentation on Recent Water Conservation Activity

Appendix V – WMWD Resolution 3166

References

References

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Appendix A

WUE and SB X7-7 Standardized Tables

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Submittal Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020 *
Add additional rows as needed			
CA3310037	City of Corona	45,124	34,241
	TOTAL	45,124	34,241
**** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*			
NOTES:			

Submittal Table 2-2: Plan Identification			
Select Only One	**Type of Plan**		**Name of RUWMP or Regional Alliance** *if applicable* (select from drop down list)
☑	**Individual UWMP**		
	☐	Water Supplier is also a member of a RUWMP	
	☐	Water Supplier is also a member of a Regional Alliance	
☐	**Regional Urban Water Management Plan (RUWMP)**		
NOTES:			

Submittal Table 2-3: Supplier Identification	
Type of Supplier (select one or both)	
☐	Supplier is a wholesaler
☑	Supplier is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables are in calendar years
☐	UWMP Tables are in fiscal years
If using fiscal years provide month and date that the fiscal year begins (mm/dd)	
Units of measure used in UWMP * (select from drop down)	
Unit	AF
**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*	
NOTES: Per capita water use is reported as gallon per capita per day (GPCD)	

Submittal Table 2-4 Retail: Water Supplier Information Exchange
The retail Supplier has informed the following wholesale supplier(s) of projected water use in accordance with Water Code Section 10631.
Wholesale Water Supplier Name
Add additional rows as needed
Western Municipal Water District
NOTES:

Submittal Table 3-1 Retail: Population - Current and Projected						
Population Served	2020	2025	2030	2035	2040	2045*(opt)*
	170,100	172,900	176,100	179,600	182,800	185,600
NOTES:						

Submittal Table 4-1 Retail: Demands for Potable and Non-Potable[1] Water - Actual			
Use Type	2020 Actual		
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool	Additional Description (as needed)	Level of Treatment When Delivered Drop down list	Volume[2]
Add additional rows as needed			
Single Family	Residential Single Family	Drinking Water	19,450
Multi-Family	Residential Multi Family	Drinking Water	2,674
Commercial	Commercial/ Institutional	Drinking Water	2,944
Industrial	Industrial	Drinking Water	1,005
Landscape	Landscape (Potable)	Drinking Water	3,226
Other Potable	Hydrants	Drinking Water	159
Sales/Transfers/Exchanges to other Suppliers	Sales to Other Agencies	Drinking Water	429
Losses	Discharge to SARI Line	Drinking Water	1,625
Losses	Real & Apparent Losses	Drinking Water	2,729
		TOTAL	34,241

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.* [2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-2 Retail: Use for Potable and Non-Potable[1] Water - Projected

Use Type	Additional Description (as needed)	Projected Water Use[2] *Report To the Extent that Records are Available*				
Drop down list May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool		2025	2030	2035	2040	2045 (opt)
Add additional rows as needed						
Single Family	Residential Single Family	18,839	18,996	19,180	19,327	19,427
Multi-Family	Residential Multi Family	2,523	2,544	2,569	2,589	2,602
Commercial	Commercial/ Institutional	3,078	3,104	3,134	3,158	3,174
Industrial	Industrial	1,044	1,053	1,063	1,071	1,077
Landscape	Landscape (Potable)	2,876	2,526	2,176	1,826	1,476
Other Potable	Hydrants	200	200	200	200	200
Sales/Transfers/Exchanges to other Suppliers	Sales to Other Agencies	200	200	200	200	200
Losses	Discharge to SARI Line	2,000	2,000	2,000	2,000	2,000
Losses	Real & Apparent Losses	2,000	2,000	2,000	2,000	2,000
	TOTAL	32,760	32,623	32,522	32,371	32,156

[1] *Recycled water demands are NOT reported in this table. Recycled water demands are reported in Table 6-4.* [2] *Units of measure (AF, CCF, MG) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-3 Retail: Total Water Use (Potable and Non-Potable)						
	2020	2025	2030	2035	2040	2045 (opt)
Potable Water, Raw, Other Non-potable *From Tables 4-1R and 4-2 R*	34,241	32,760	32,623	32,522	32,371	32,156
Recycled Water Demand[1] *From Table 6-4*	3,781	4,795	5,145	5,495	5,845	6,195
Optional Deduction of Recycled Water Put Into Long-Term Storage[2]						
TOTAL WATER USE	38,022	37,555	37,768	38,017	38,216	38,351

[1] Recycled water demand fields will be blank until Table 6-4 is complete

[2] Long term storage means water placed into groundwater or surface storage that is not removed from storage in the same year. Supplier ***may*** *deduct recycled water placed in long-term storage from their reported demand. This value is manually entered into Table 4-3.*

NOTES:

Submittal Table 4-4 Retail: Last Five Years of Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss [1,2]
07/2015	904
07/2016	1,834
07/2017	1,282
07/2018	1,419
07/2019	1,108

[1] *Taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet.*

[2] ***Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	Yes
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, or otherwise are utilized in demand projections are found.	Section 4.3.4
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes
NOTES:	

Submittal Table 5-1 Baselines and Targets Summary **From SB X7-7 Verification Form** *Retail Supplier or Regional Alliance Only*				
Baseline Period	Start Year *	End Year *	Average Baseline GPCD*	Confirmed 2020 Target*
10-15 year	*1998*	*2007*	*262*	*213*
5 Year	*2003*	*2007*	*269*	
**All cells in this table should be populated manually from the supplier's SBX7-7 Verification Form and reported in Gallons per Capita per Day (GPCD)*				
NOTES:				

Submittal Table 5-2: 2020 Compliance From SB X7-7 2020 Compliance Form *Retail Supplier or Regional Alliance Only*				
2020 GPCD			2020 Confirmed Target GPCD*	Did Supplier Achieve Targeted Reduction for 2020? Y/N
Actual 2020 GPCD*	2020 TOTAL Adjustments*	Adjusted 2020 GPCD* *(Adjusted if applicable)*		
180	*0*	*180*	*213*	*Y*
**All cells in this table should be populated manually from the supplier's SBX7-7 2020 Compliance Form and reported in Gallons per Capita per Day (GPCD)*				
NOTES:				

Submittal Table 6-1 Retail: Groundwater Volume Pumped

☐	Supplier does not pump groundwater. The supplier will not complete the table below.
☑	All or part of the groundwater described below is desalinated.

Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2016*	2017*	2018*	2019*	2020*
Add additional rows as needed						
Alluvial Basin	Temescal Basin	13391	13173	15461	15894	16239
Alluvial Basin	Bedford-Coldwater Basin	1968	767	178	0	0
	TOTAL	15,359	13,940	15,639	15,894	16,239

*** Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Groundwater from the Temescal Basin is treated at the Temescal Desalter.

Submittal Table 6-2 Retail: Wastewater Collected Within Service Area in 2020

☐	There is no wastewater collection system. The supplier will not complete the table below.
	Percentage of 2020 service area covered by wastewater collection system *(optional)*
	Percentage of 2020 service area population covered by wastewater collection system *(optional)*

Wastewater Collection			Recipient of Collected Wastewater			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected from UWMP Service Area 2020 *	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
City of Corona	Metered	12,336	City of Corona	WRF-1	Yes	No
City of Corona	Metered	2,144	City of Corona	WRF-2	Yes	No
City of Corona	Metered	954	City of Corona	WRF-3	Yes	No
Total Wastewater Collected from Service Area in 2020:		15,434				

**** Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3* **.**

NOTES:

Submittal Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2020

☐ **No wastewater is treated or disposed of within the UWMP service area.** The supplier will not complete the table below.

Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)* [2]	Method of Disposal *Drop down list*	Does This Plant Treat Wastewater Generated Outside the Service Area? *Drop down list*	Treatment Level *Drop down list*	2020 volumes [1] Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area	Instream Flow Permit Requirement
WRF-1	Temescal Creek	Creek		River or creek outfall	No	Tertiary	1,770	1,770	0		
WRF-1	Reclaim Flow	Reclaimed Water System		Other	No	Tertiary	5,580	0	5,580		
WRF-1	Ponds	Ponds		Percolation ponds	No	Tertiary	4,987	4,987	0		
WRF-2	Ponds	Ponds		Percolation ponds	No	Tertiary	1,774	1,774	0		
WRF-2	Reclaim Flow	Reclaimed Water System		Other	No	Tertiary	371	0	371		
WRF-3	Reclaim Flow	Reclaimed Water System		Other	No	Tertiary	954	0	954		
						Total	15,436	8,531	6,905	0	0

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

[2] If the **Wastewater Discharge ID Number** is not available to the UWMP preparer, access the SWRCB CIWQS regulated facility website at https://ciwqs.waterboards.ca.gov/ciwqs/readOnly/CiwqsReportServlet?inCommand=reset&reportName=RegulatedFacility

NOTES:

Submittal Table 6-4 Retail: Recycled Water Direct Beneficial Uses Within Service Area

☐ Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Name of Supplier Producing (Treating) the Recycled Water:	City of Corona
Name of Supplier Operating the Recycled Water Distribution System:	City of Corona
Supplemental Water Added in 2020 (volume) *Include units*	
Source of 2020 Supplemental Water	

Beneficial Use Type *Insert additional rows if needed.*	**Potential** Beneficial Uses of Recycled Water (Describe)	Amount of **Potential** Uses of Recycled Water (Quantity) *Include volume units* [1]	General Description of 2020 Uses	Level of Treatment *Drop down list*	2020 [1]	2025 [1]	2030[1]	2035[1]	2040[1]	2045[1] (opt)
Agricultural irrigation										
Landscape irrigation (exc golf courses)										
Golf course irrigation										
Commercial use										
Industrial use										
Geothermal and other energy production										
Seawater intrusion barrier										
Recreational impoundment										
Wetlands or wildlife habitat										
Groundwater recharge (IPR)										
Reservoir water augmentation (IPR)										
Direct potable reuse										
Other (Description Required)	Undifferentiated Beneficial Uses		Landscaping irrigation, toilet flushing via dual plumbed system, firefighting, dust control, and various construction applications	Tertiary	3,781	4,795	5,145	5,495	5,845	6,195
				Total:	3,781	4,795	5,145	5,495	5,845	6,195
				2020 Internal Reuse						

[1] ***Units of measure (AF, CCF, MG)*** *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 6-5 Retail: 2015 UWMP Recycled Water Use Projection Compared to 2020 Actual		
☐	Recycled water was not used in 2015 nor projected for use in 2020. The supplier will not complete the table below. If recycled water was not used in 2020, and was not predicted to be in 2015, then check the box and do not complete the table.	
Beneficial Use Type	**2015 Projection for 2020** [1]	**2020 Actual Use**[1]
Insert additional rows as needed.		
Agricultural irrigation		
Landscape irrigation (exc golf courses)		
Golf course irrigation		
Commercial use		
Industrial use		
Geothermal and other energy production		
Seawater intrusion barrier		
Recreational impoundment		
Wetlands or wildlife habitat		
Groundwater recharge (IPR)		
Reservoir water augmentation (IPR)		
Direct potable reuse		
Other (Description Required)	5,111	3,781
Total	5,111	3,781

[1] **Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.

NOTE: Undifferentiated Beneficial Uses

Submittal Table 6-6 Retail: Methods to Expand Future Recycled Water Use

☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use *
Add additional rows as needed			
Large Distribution Pipelines	Buena Vista Tenth Pipeline, Ontario Slipline, Sampson Pipeline, River Pipeline	2025-2045	842
Medium Distribution Pipelines	Old Temescal, Lincoln Foothill, Avenida Del Vista, Border, Promenade, Research, Smith, Via Pacifica, and Tehachapi Pipelines	2025-2045	259
Small Distribution Pipelines	Jenks, Airport Circle, Helicopter, Glider, Citation, Klug, Monica, Chase Hudson, Cessna, and Main Citrus Pipelines	2025-2045	85
Conversion of Adjacent Demands	Commercial, Industrial, Institutional, Multi-Family Residential, and Single Family Residential	2025-2045	225
		Total	1,411

Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Project implementation will depend on funding and opportunity and schedule is still under review. The City anticipates adding approximately 350 AFY every five years.

Submittal Table 6-7 Retail: Expected Future Water Supply Projects or Programs

☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.
	Provide page location of narrative in the UWMP

Name of Future Projects or Programs	Joint Project with other suppliers?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List*	Expected Increase in Water Supply to Supplier* *This may be a range*
	Drop Down List (y/n)	*If Yes, Supplier Name*				
Add additional rows as needed						
Bedford-Coldwater Groundwater Treatment	No		Groundwater Treatment	2025	All Year Types	2,112
Reclaimed Water Supply Improvements	Yes	WRCRWA	City to receive 2.0 MGD of tertiary treated reclaimed water from WRCRWA	2025	All Year Types	2,240
Coldwater Pit	Yes	RCFC&WCD, EVMWD, TVWD	Conversion of gravel mine into recharge basin for Bedford-Coldwater Basin	2030	All Year Types	0

Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Treatment in the Bedford-Coldwater Basin is required for the City to exercise its water rights. Coldwater Pit project intent is to enhance groundwater storage capacity and will not increase normal supply; however, under single dry year and multiple dry year conditions, stored groundwater may be used to offset a drop in imported water supply availability.

Submittal Table 6-8 Retail: Water Supplies — Actual

Water Supply	Additional Detail on Water Supply	2020		
Drop down list May use each category multiple times.These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Actual Volume*	Water Quality Drop Down List	Total Right or Safe Yield* (optional)
Add additional rows as needed				
Purchased or Imported Water	WMWD Mills WTP	1,229	Drinking Water	
Purchased or Imported Water	WMWD (Raw Water)	16,743	Other Non-Potable Water	
Purchased or Imported Water	WMWD Arlington Desalter	33	Other Non-Potable Water	
Desalinated Water - Groundwater	Temescal Basin	16,239	Drinking Water	
Groundwater (not desalinated)	Bedford-Coldwater Basin	0	Drinking Water	
Recycled Water	Reclaimed Water	12,695	Recycled Water	
	Total	46,939		0

Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 6-9 Retail: Water Supplies — Projected

Water Supply	Additional Detail on Water Supply	Projected Water Supply * Report To the Extent Practicable									
		2025		**2030**		**2035**		**2040**		**2045** (opt)	
Drop down list May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool		Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)	Reasonably Available Volume	Total Right or Safe Yield (optional)
Add additional rows as needed											
Purchased or Imported Water	WMWD (all sources)	21,110	21,110	21,110	21,110	21,110	21,110	21,110	21,110	21,110	21,110
Desalinated Water - Groundwater	Temescal Basin	13,000	21,725	13,000	21,725	13,000	21,725	13,000	21,725	13,000	21,725
Groundwater (not desalinated)	Bedford-Coldwater Basin	2,112	2,112	2,112	2,112	2,112	2,112	2,112	2,112	2,112	2,112
Recycled Water	Reclaimed Water	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
	Total	46,222	54,947	46,222	54,947	46,222	54,947	46,222	54,947	46,222	54,947

***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES: Non-potable groundwater from the Bedford-Coldwater Basin is used to supplement the recycled water supply during peak demand months in the summer.

Submittal Table 7-1 Retail: Basis of Water Year Data (Reliability Assessment)			
Year Type	**Base Year** If not using a calendar year, type in the last year of the fiscal, water year, or range of years, for example, water year 2019-2020, use 2020	**Available Supplies if Year Type Repeats**	
		☐ Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP. Location ______________________________	
		☑ Quantification of available supplies is provided in this table as either volume only, percent only, or both.	
		Volume Available *	**% of Average Supply**
Average Year	2017-2019		100%
Single-Dry Year	2007		100%
Consecutive Dry Years 1st Year	2011		100%
Consecutive Dry Years 2nd Year	2012		100%
Consecutive Dry Years 3rd Year	2013		100%
Consecutive Dry Years 4th Year	2014		100%
Consecutive Dry Years 5th Year	2015		100%

Supplier may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If a Supplier uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.

***Units of measure (AF, CCF, MG**) must remain consistent throughout the UWMP as reported in Table 2-3.*

NOTES:

Submittal Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 *(Opt)*
Supply totals (*autofill from Table 6-9)*	46,222	46,222	46,222	46,222	46,222
Demand totals *(autofill from Table 4-3)*	37,555	37,768	38,017	38,216	38,351
Difference	8,667	8,454	8,205	8,006	7,871
NOTES:					

Submittal Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2025	2030	2035	2040	2045 (Opt)
Supply totals*	46,222	46,222	46,222	46,222	46,222
Demand totals*	39,358	39581	39,842	40,051	40,192
Difference	6,864	6,641	6,380	6,171	6,030
Units of measure (AF, CCF, MG) *must remain consistent throughout the UWMP as reported in Table 2-3.*					
NOTES:					

Submittal Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2025*	2030*	2035*	2040*	2045* (Opt)
First year	Supply totals	46,222	46,222	46,222	46,222	46,222
	Demand totals	38,382	38,599	38,854	39,057	39,195
	Difference	7,840	7,623	7,368	7,165	7,027
Second year	Supply totals	46,222	46,222	46,222	46,222	46,222
	Demand totals	40,635	40,865	41,135	41,350	41,496
	Difference	5,587	5,357	5,087	4,872	4,726
Third year	Supply totals	46,222	46,222	46,222	46,222	46,222
	Demand totals	42,212	42,452	42,731	42,955	43,107
	Difference	4,010	3,770	3,491	3,267	3,115
Fourth year	Supply totals	46,222	46,222	46,222	46,222	46,222
	Demand totals	41,987	42,225	42,503	42,726	42,877
	Difference	4,235	3,997	3,719	3,496	3,345
Fifth year	Supply totals	46,222	46,222	46,222	46,222	46,222
	Demand totals	38,757	38,977	39,234	39,439	39,579
	Difference	7,465	7,245	6,988	6,783	6,643
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
***Units of measure (AF, CCF, MG)** must remain consistent throughout the UWMP as reported in Table 2-3.*						
NOTES:						

Submittal Table 7-5: Five-Year Drought Risk Assessment Tables to address Water Code Section 10635(b)

2021	Total
Total Water Use	38,858
Total Supplies	47,280
Surplus/Shortfall w/o WSCP Action	8,422
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	8,422
Resulting % Use Reduction from WSCP action	0%

2022	Total
Total Water Use	41,140
Total Supplies	47,280
Surplus/Shortfall w/o WSCP Action	6,140
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	6,140
Resulting % Use Reduction from WSCP action	0%

2023	Total
Total Water Use	42,737
Total Supplies	47,280
Surplus/Shortfall w/o WSCP Action	4,543
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	4,543
Resulting % Use Reduction from WSCP action	0%

2024	Total
Total Water Use	42,509
Total Supplies	47,280
Surplus/Shortfall w/o WSCP Action	4,771
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	4,771
Resulting % Use Reduction from WSCP action	0%

2025	Total
Total Water Use	39,239
Total Supplies	47,280
Surplus/Shortfall w/o WSCP Action	8,041
Planned WSCP Actions (use reduction and supply augmentation)	
WSCP - supply augmentation benefit	
WSCP - use reduction savings benefit	
Revised Surplus/(shortfall)	8,041
Resulting % Use Reduction from WSCP action	0%

Submittal Table 8-1
Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage Range	Shortage Response Actions (*Narrative description)*
1	Up to 10%	Water Conservation Stage 1
2	Up to 20%	Water Conservation Stage 2
3	Up to 30%	Water Conservation Stage 2
4	Up to 40%	Water Conservation Stage 3
5	Up to 50%	Water Conservation Stage 4
6	>50%	Water Conservation Stage 5

NOTES: The City's WSCP was adopted through Ordinance 2962. See UWMP Section 8.5 for additional shortage response action discussion.

Submittal Table 8-2: Demand Reduction Actions				
Shortage Level	Demand Reduction Actions ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool. Select those that apply.*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? ***For Retail Suppliers Only*** *Drop Down List*
Add additional rows as needed				
3	CII - Restaurants may only serve water upon request	3,835 to 5,753 AFY		Yes
4	Other	5,753 to 7,670 AFY	Except as otherwise provided, all water conservation and drought response measures of Water Conservation Stages 1 and 2 shall be in full force and effect during Water Conservation Stage 3.	Yes
4	Landscape - Limit landscape irrigation to specific times	5,753 to 7,670 AFY	Lawns and/or ground covers may be watered and landscaping may be irrigated, including construction meter irrigation, for a maximum number of minutes per day.	Yes
4	Landscape - Limit landscape irrigation to specific days	5,753 to 7,670 AFY	Lawns and/or ground cover may be watered and landscaping may be irrigated for properties with odd number street addresses, up to three days per week and only on Saturdays, Mondays and Wednesdays.	Yes
4	Landscape - Limit landscape irrigation to specific days	5,753 to 7,670 AFY	Lawns and/or ground cover may be watered and landscaping may be irrigated for properties with even number street addresses, up to three days per week and only on Sundays, Tuesdays and Thursdays.	Yes
4	Landscape - Limit landscape irrigation to specific days	5,753 to 7,670 AFY	Watering lawns and/or ground cover and irrigating landscaping is prohibited on Fridays and on any day of the week outside of the designated water windows.	Yes
4	Landscape - Limit landscape irrigation to specific days	5,753 to 7,670 AFY	A govenunent agency may water lawns and/or ground cover and irrigate landscaping on day(s) of the agency's choosing, up to three days per week.	Yes
4	Other water feature or swimming pool restriction	5,753 to 7,670 AFY	The overfilling of swimming pools and spas is prohibited.	Yes
4	Water Features - Restrict water use for decorative water features, such as fountains	5,753 to 7,670 AFY	The filling or refilling of ornamental ponds, streams, and artificial lakes is prohibited.	Yes

4	Water Features - Restrict water use for decorative water features, such as fountains	5,753 to 7,670 AFY	The operation of any ornamental fountain or similar structure is prohibited except for short periods of time to prevent damage, unless the fountain recirculates water.	Yes
4	Landscape - Prohibit certain types of landscape irrigation	5,753 to 7,670 AFY	Construction projects shall only use reclaimed water except as approved by the General Manager and shall not use water unnecessarily for any purposes other than those required by regulatory agencies. Construction projects requiring water for new landscapes shall adhere to the designated days and watering windows. Further, construction projects necessary to maintain the health, safety, and welfare of the public, as determined by the city, are exempt from these regulations.	Yes
5	Other	7,670 to 15,340 AFY	Except as otherwise provided, all water conservation and drought response measures of Water Conservation Stages 1, 2 and 3 shall be in full force and effect during Water Conservation Stage 4.	Yes
5	Landscape - Prohibit certain types of landscape irrigation	7,670 to 15,340 AFY	Irrigation of landscaping shall be limited to supporting minimal survival of trees and shrubs.	Yes
5	Landscape - Prohibit certain types of landscape irrigation	7,670 to 15,340 AFY	All outdoor watering and irrigation of lawns and ground covers is prohibited with the exception of plant materials classified and determined by the City Manager to be rare, exceptionally valuable, or essential to the well-being of the public at large or rare animals, and for which relief has been otherwise granted.	Yes

5	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water	7,670 to 15,340 AFY	The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is prohibited. Washing is permitted at any time on the immediate premises of a commercial car wash. Commercial car washes shall only use partially reclaimed or recycled water.	Yes
5	Other water feature or swimming pool restriction	7,670 to 15,340 AFY	The filling, refilling, or adding of water to swimming pools and spas or ornamental ponds, streams, and artificial lakes is prohibited.	Y
5	Water Features - Restrict water use for decorative water features, such as fountains	7,670 to 15,340 AFY	The operation of any ornamental fountain, pond, or similar structure is prohibited except for short periods of time to prevent damage.	Yes
5	Other	7,670 to 15,340 AFY	The use of water for cooling mists is prohibited.	Yes
5	CII - Other CII restriction or prohibition	7,670 to 15,340 AFY	The use of water for commercial, manufacturing, or processing purposes shall be reduced in volume by an amount determined by the General Manager.	Yes
5	Other	7,670 to 15,340 AFY	No new construction meters will be issued.	Yes
5	Other	7,670 to 15,340 AFY	Construction water shall not be used for earth work, road construction purposes, dust control, compaction, or trenching jetting.	Yes
5	Other	7,670 to 15,340 AFY	No new building permit(s) shall be provided, except in the following circumstances: (a) For projects necessary to protect the public's health, safety, and welfare (b) When using reclaimed water (c) When the recipient of the building permit can demonstrate that no net increase in water use will occur (d) Where the recipient of the building permit provides a conservation offset.	Yes

6	Other	7,670 to 15,340 AFY	Except as otherwise provided, all water conservation and drought response measures of Water Conservation Stages 1, 2, 3 and 4 shall be in full force and effect during Water Conservation Stage 5.	Yes
6	Landscape - Other landscape restriction or prohibition	7,670 to 15,340 AFY	All outdoor watering and irrigation of lawns and ground cover, and landscaping is prohibited, with the exception of the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs, which is permitted on any day and at any time.	Yes
6	CII - Other CII restriction or prohibition	7,670 to 15,340 AFY	The city shall not allow any new connections to the water system.	Yes
2	Landscape - Restrict or prohibit runoff from landscape irrigation	0 AFY		No
2	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner	0 AFY		No
2	Other - Prohibit use of potable water for washing hard surfaces	0 AFY		No
2	Landscape - Other landscape restriction or prohibition	0 AFY	Prohibit the application of potable water to outdoor landscapes during and within 48 hours after rainfall measuring one-half (1/2) inch or more.	No
2	Landscape - Limit landscape irrigation to specific times	0 AFY	Lawns and/or ground cover may be watered and landscaping may be irrigated for private properties, parks, and the public right-of-ways, only between the hours of 8:00 p.m. and 10:00 a.m., if the watering and irrigation is performed with potable water. This restriction shall not apply to watering and irrigation performed with reclaimed water	No
3	Other	3,835 to 5,753 AFY	Use of water from fire hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain the health, safety, and welfare of the public.	Yes
3	Other water feature or swimming pool restriction	3,835 to 5,753 AFY	All swimming pools, spas, ponds, and fountains shall be equipped with re-circulating pumps	Yes
3	Other - Require automatic shut of hoses	3,835 to 5,753 AFY		Yes
3	Landscape - Other landscape restriction or prohibition	3,835 to 5,753 AFY	The use of reclaimed water to water / irrigate is permitted on any day and at any time	No

3	Landscape - Limit landscape irrigation to specific days	3,835 to 5,753 AFY	A govermnent agency may water / irrigate with potable water on three days per week of the agency's choosing	Yes
3	Landscape - Limit landscape irrigation to specific days	3,835 to 5,753 AFY	Watering / irrigating is prohibited on Fridays and on any day of the week outside of the designated watering windows	Yes
3	Landscape - Limit landscape irrigation to specific days	3,835 to 5,753 AFY	Even number street addresses, parks and the public right-of-ways, allowed to water / irrigate with potable water only on Sundays, Tuesdays and Thursdays	Yes
3	Other	3,835 to 5,753 AFY	Except as otherwise provided, all water conservation and drought response measures of Water Conservation Stage 1 shall be in full force and effect during Water Conservation Stage 2.	Yes
3	Landscape - Other landscape restriction or prohibition	3,835 to 5,753 AFY	Watering / irrigating, including construction meter irrigation, allowed for a maximum of 20 minutes per day	Yes
3	Landscape - Limit landscape irrigation to specific days	3,835 to 5,753 AFY	Odd number street addresses, parks and the public right-of-ways, allowed to water / irrigate with potable water only on Saturdays, Mondays and Wednesdays	Yes
NOTES: Restrictions and prohibitions for each stage are additive to the stage before. Irrigaiton restrictions become progressively more strict with each stage. Shortage gap reduction shown is the total estimated reduction for all actions under the Shortage Level.				

Submittal Table 8-3: Supply Augmentation and Other Actions			
Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	How much is this going to reduce the shortage gap? *Include units used (volume type or percentage)*	Additional Explanation or Reference *(optional)*
Add additional rows as needed			
All	Other Actions (describe)	0 to 15,340 AFY	Develop, promote, and administer water conservation programs for:converting, where financially and technically feasible, potable water distribution systems to recycled water distribution systems for landscaped areas of residential, commercial, industrial, and public property rights-of-way
All	Other Actions (describe)	0 to 15,340 AFY	Develop, promote, and administer water conservation programs for:installing, or providing rebate programs for the installation of, water saving devices and irrigation systems in the landscaped areas of residential, commercial, industrial, and public property and public rights-of-way
6	Other Actions (describe)	7,670 to 15,340 AFY	The city shall not allow any new connections to the water system.
All	Other Actions (describe)	0 to 15,340 AFY	Develop, promote, and administer water conservation programs for:replacing landscaping and turf with drought tolerant plan material and water efficient landscaping
All	Expand Public Information Campaign	0 to 15,340 AFY	Develop, promote, and administer water conservation programs for:developing educational programs to promote water conservation
5	Other Actions (describe)	7,670 to 15,340 AFY	No new building permit(s) shall be provided, except in the following circumstances: (a) For projects necessary to protect the public's health, safety, and welfare (b) When using reclaimed water (c) When the recipient of the building permit can demonstrate that no net increase in water use will occur (d) Where the recipient of the building permit provides a conservation offset.
All	Transfers		As needed and available
All	Exchanges		As needed and available
All	Other Purchases		As needed and available

NOTES: Shortage gap reduction shown is the total estimated reduction for all actions under the Shortage Level.

Submittal Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Riverside	No	Yes
Norco	No	Yes
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Riverside County	Yes	Yes
NOTES:		

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	170,100
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	34,244	429		-		-	**33,815**

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	WMWD
This water source is *(check one)* :	
☐	The supplier's own water source
☑	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	18,005	-	18,005

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* :	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* *(+/-)*	Corrected Volume Entering Distribution System
	16,239		16,239

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment -*** *See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-B: 2020 Indirect Recycled Water Use Deduction *(For use only by agencies that are deducting indirect recycled water)*

2020 Compliance Year	2020 Surface Reservoir Augmentation					2020 Groundwater Recharge			Total Deductible Volume of Indirect Recycled Water Entering the Distribution System
	Volume Discharged from Reservoir for Distribution System Delivery[1]	Percent Recycled Water	Recycled Water Delivered to Treatment Plant	Transmission/ Treatment Loss[1]	Recycled Volume Entering Distribution System from Surface Reservoir Augmentation	Recycled Water Pumped by Utility[1,2]	Transmission/ Treatment Losses[1]	Recycled Volume Entering Distribution System from Groundwater Recharge	
			-		-			-	-

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] *Suppliers will provide supplemental sheets to document the calculation for their input into "Recycled Water Pumped by Utility". The volume reported in this cell must be less than total groundwater pumped - See Methodology 1, Step 8, section 2.c.*

NOTES: N/A

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C: 2020 Process Water Deduction Eligibility (For use only by agencies that are deducting process water) Choose Only One	
☐	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES: N/A	

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.1: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 1)*				
Criteria 1 Industrial water use is equal to or greater than 12% of gross water use				
2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction	2020 Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
	33,815		0%	NO
NOTES: N/A				

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.2: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 2)*				
Criteria 2 Industrial water use is equal to or greater than 15 GPCD				
2020 Compliance Year	2020 Industrial Water Use	2020 Population	2020 Industrial GPCD	**Eligible for Exclusion Y/N**
		170,100	-	NO
NOTES: N/A				

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.3: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 3)*

Criteria 3
Non-industrial use is equal to or less than 120 GPCD

2020 Compliance Year	2020 Gross Water Use Without Process Water Deduction *Fm SB X7-7 Table 4*	2020 Industrial Water Use	2020 Non-industrial Water Use	2020 Population *Fm SB X7-7 Table 3*	Non-Industrial GPCD	**Eligible for Exclusion Y/N**
	33,815		33,815	170,100	177	NO

NOTES:

Data from this table will not be entered into WUEdata.
Instead, the entire table will be uploaded to WUEdata as a separate upload in Excel format.

SB X7-7 Table 4-C.4: 2020 Process Water Deduction Eligibility *(For use only by agencies that are deducting process water using Criteria 4)*

Criteria 4

Disadvantaged Community. A "Disadvantaged Community" (DAC) is a community with a median household income less than 80 percent of the statewide average.

SELECT ONE

"Disadvantaged Community" status was determined using one of the methods listed below:

1. IRWM DAC Mapping tool https://gis.water.ca.gov/app/dacs/

☐ If using the IRWM DAC Mapping Tool, include a screen shot from the tool showing that the service area is considered a DAC.

2. 2020 Median Income

☑

California Median Household Income*		Service Area Median Household Income	Percentage of Statewide Average	**Eligible for Exclusion? Y/N**
2020	**$75,235**	$86,790	115%	NO

*California median household income 2015 -2019 as reported in US Census Bureau QuickFacts.

NOTES

Data from these tables will not be entered into WUEdata. Instead, the entire tables will be uploaded to WUEdata as a separate upload in Excel format.

This table(s) is only for Suppliers that deduct process water from their 2020 gross water use.

SB X7-7 Table 4-D: 2020 Process Water Deduction - Volume

Complete a separate table for each industrial customer with a process water exclusion

Name of Industrial Customer	*Enter Name of Industrial Customer 1*				
Compliance Year 2020	Industrial Customer's Total Water Use *	Total Volume Provided by Supplier*	% of Water Provided by Supplier	Customer's Total Process Water Use*	Volume of Process Water Eligible for Exclusion for this Customer
					-

* **Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES: N/A

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water ***Fm SB X7-7 Table 4***	**2020 Population** ***Fm SB X7-7 Table 3***	**2020 GPCD**
33,815	170,100	**177**
NOTES:		

SB X7-7 Table 9: 2020 Compliance

Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD					2020 Confirmed Target GPCD [1, 2]	Did Supplier Achieve Targeted Reduction for 2020?
	Enter "0" if Adjustment Not Used			TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*		
	Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]				
177	-	-	-	-	177	213	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

Appendix B

California Water Code

Urban Water Management Planning

The following is Appendix A from the UWMP Guidebook 2020. This document presents updated sections of the Water Code as of January 1, 2020, as compiled by DWR staff, and focuses on the portions of code directly relevant to preparation of the urban water management plan.

Appendix A. California Water Code – Urban Water Management Planning

This material is for informational purposes only and not to be used in place of official California Water Code (Water Code).

This document presents updated sections of Water Code as of January 1, 2020, as compiled by DWR staff. The selection focuses on the portions of code directly relevant to preparation of the urban water management plan and contextually relevant to urban water suppliers and the Department of Water Resources (DWR). This includes the Urban Water Management Planning Act and the Sustainable Water Use and Demand Reduction (SB X7-7), and more. Further legislative information is available on the California Legislative Information website at
https://leginfo.legislature.ca.gov/.

The following Water Code sections are included in this appendix.

- **Sustainable Water Use and Demand Reduction (SB X7-7) Water Code Division 6, Part 2.55**
    - **Chapter 1. General Declarations and Policy**, Sections 10608 – 10608.8
    - **Chapter 2. Definitions**, Section 10608.12
    - **Chapter 3. Urban Retail Water Suppliers**, Sections 10608.16 – 10608.44
    - **Chapter 4. Agricultural Water Suppliers**, Section 10608.48
    - **Chapter 5. Sustainable Water Management**, Section 10608.50
    - **Chapter 6. Standardized Data Collection**, Section 10608.52
    - **Chapter 7. Funding Provisions**, Sections 10608.56 – 10608.60
    - **Chapter 8. Quantifying Agricultural Water Use Efficiency**, Section 10608.64

- **Urban Water Management Planning Act**
  Water Code Division 6, Part 2.6
  - **Chapter 1. General Declaration and Policy**, Sections 10610 – 10610.4
  - **Chapter 2. Definitions**, Sections 10611 – 10618
  - **Chapter 3. Urban Water Management Plans**
    Article 1. General Provisions, Sections 10620 – 10621
    Article 2. Contents of Plans, Sections 10630 – 10634
    Article 2.5. Water Service Reliability, Section 10635
    Article 3. Adoption and Implementation of Plans, Sections 10640 – 10645
  - **Chapter 4. Miscellaneous Provisions**, Sections 10650 – 10657

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
CHAPTER 1. General Declaration and Policy [10608 – 10608.8]

10608. The Legislature finds and declares all of the following:

(a) Water is a public resource that the California Constitution protects against waste and unreasonable use.

(b) Growing population, climate change, and the need to protect and grow California’s economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.

(c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.

(d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

(e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

(f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.

(g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.

(h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.

(i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

10608.4. It is the intent of the Legislature, by the enactment of this part, to do all of the following:

(a) Require all water suppliers to increase the efficiency of use of this essential resource.

(b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.

(c) Measure increased efficiency of urban water use on a per capita basis.

(d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.

(e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.

(f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.

(g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.

(h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.

(i) Require implementation of specified efficient water management practices for agricultural water suppliers.

(j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.

(k) Advance regional water resources management.

10608.8. (a) (1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

CHAPTER 2. Definitions [10608.12]

10608.12. Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the

calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "CII water use" means water used by commercial water users, industrial water users, institutional water users, and large landscape water users.

(e) "Commercial water user" means a water user that provides or distributes a product or service.

(f) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(g) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long-term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(i) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(j) “Institutional water user” means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

(k) “Interim urban water use target” means the midpoint between the urban retail water supplier’s base daily per capita water use and the urban retail water supplier’s urban water use target for 2020.

(l) “Large landscape” means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.

(m) “Locally cost effective” means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(n) “Performance measures” means actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users. Performance measures may include, but are not limited to, educating CII water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not include process water.

(o) “Potable reuse” means direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation as those terms are defined in Section 13561.

(p) “Process water” means water used by industrial water users for producing a product or product content or water used for research and development. Process water includes, but is not limited to, continuous manufacturing processes, and water used for testing, cleaning, and maintaining equipment. Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product quality or chemical characteristics for product manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water. Process water does not mean incidental water uses.

(q) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050.

(r) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(s) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(t) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(u) "Urban water use objective" means an estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in Section 10609.20.

(v) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(w) "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

CHAPTER 3. Urban Retail Water Suppliers [10608.16 – 10608.44]

10608.16. (a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(1) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

10608.20. (a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2017 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its internet website, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water

supplier and urban retail water suppliers.

10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

10608.24. (a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

(b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

(c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.

(d) (1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

(e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.

(f) (1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

(2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section 10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

10608.26. (a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's implementation plan for complying with this part shall consider the conservation of that military installation under federal Executive Order 13514.

(d) (1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

(2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

10608.28. (a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the

department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

10608.32. All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and approval by the Public Utilities Commission, and may be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

10608.34. (a) (1) On or before January 1, 2017, the department shall adopt rules for all of the following:

(A) The conduct of standardized water loss audits by urban retail water suppliers in accordance with the method adopted by the American Water Works Association in the third edition of Water Audits and Loss Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0.

(B) The process for validating a water loss audit report prior to submitting the report to the department. For the purposes of this section, “validating” is a process whereby an urban retail water supplier uses a technical expert to confirm the basis of all data entries in the urban retail water supplier’s water loss audit report and to appropriately characterize the quality of the reported data. The validation process shall follow the principles and terminology laid out by the American Water Works Association in the third edition of Water Audits and Loss Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0. A validated water loss audit report shall include the name and technical qualifications of the person engaged for validation.

(C) The technical qualifications required of a person to engage in validation, as described in subparagraph (B).

(D) The certification requirements for a person selected by an urban retail water supplier to provide validation of its own water loss audit report.

(E) The method of submitting a water loss audit report to the department.

(2) The department shall update rules adopted pursuant to paragraph (1) no later than six months after the release of subsequent editions of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36. Except as provided by the department, until the department adopts updated rules pursuant to this paragraph, an urban retail water supplier may rely upon a subsequent edition of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36 or the Free Water Audit Software.

(b) (1) On or before October 1 of each year until October 1, 2023, each urban retail water supplier reporting on a calendar year basis shall submit a completed and validated water loss audit report for the previous calendar year or the previous fiscal year as prescribed by the department pursuant to subdivision (a).

(2) On or before January 1 of each year until January 1, 2024, each urban retail water supplier reporting on a fiscal year basis shall submit a completed and validated water loss audit report for the previous fiscal year as prescribed by the department pursuant to subdivision (a).

(3) On or before January 1, 2024, and on or before January 1 of each year thereafter, each urban retail water supplier shall submit a completed and validated water loss audit report for the previous calendar year or previous fiscal year as part of the report submitted to the department pursuant to subdivision (a) of Section 10609.24 and as prescribed by the department pursuant to subdivision (a).

(4) Water loss audit reports submitted on or before October 1, 2017, may be completed and validated with assistance as described in subdivision (c).

(c) Using funds available for the 2016–17 fiscal year, the board shall contribute up to four hundred thousand dollars ($400,000) towards procuring water loss audit report validation assistance for urban retail water suppliers.

(d) Each water loss audit report submitted to the department shall be accompanied by information, in a form specified by the department, identifying steps taken in the preceding year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses.

(e) At least one of the following employees of an urban retail water supplier shall attest to each water loss audit report submitted to the department:

(1) The chief financial officer.

(2) The chief engineer.

(3) The general manager.

(f) The department shall deem incomplete and return to the urban retail water supplier any final water loss audit report found by the department to be incomplete, not validated, unattested, or incongruent with known characteristics of water system operations. A water supplier shall resubmit a completed water loss audit report within 90 days of an audit being returned by the department.

(g) The department shall post all validated water loss audit reports on its internet website in a manner that allows for comparisons across water suppliers. The department shall make the validated water loss audit reports available for public viewing in a timely manner after their receipt.

(h) Using available funds, the department shall provide technical assistance to guide urban retail water suppliers' water loss detection programs, including, but not limited to, metering techniques, pressure management techniques, condition-based assessment techniques for transmission and distribution pipelines, and utilization of portable and permanent water loss detection devices.

(i) No earlier than January 1, 2019, and no later than July 1, 2020, the board shall adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses. In adopting these rules, the board shall employ full life-cycle cost accounting to evaluate the costs of meeting the performance standards. The board may consider establishing a minimum allowable water loss threshold that, if reached and maintained by an urban water supplier, would exempt the urban water supplier from further water loss reduction requirements.

10608.35. (a) The department, in coordination with the board, shall conduct necessary studies and investigations and make a recommendation to the Legislature, by January 1, 2020, on the feasibility of developing and enacting water loss reporting requirements for urban wholesale water suppliers.

(b) The studies and investigations shall include an evaluation of the suitability of applying the processes and requirements of Section 10608.34 to urban wholesale water suppliers.

(c) In conducting necessary studies and investigations and developing its recommendation, the department shall solicit broad public participation from stakeholders and other interested persons.

10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.40. Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

10608.42. (a) The department shall review the 2015 urban water management plans and report to the Legislature by July 1, 2017, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets to achieve the 20-percent reduction and to reflect updated efficiency information and technology changes.

(b) A report to be submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

10608.43. The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

(a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.

(b) Evaluation of water demands for manufacturing processes, goods, and cooling.

(c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.

(d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.

(e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

10608.44. Each state agency shall reduce water use at facilities it operates to support urban retail water suppliers in meeting the target identified in

Section 10608.16.

CHAPTER 4. Agricultural Water Suppliers [10608.48]

10608.48. (a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).

(b) Agricultural water suppliers shall implement both of the following critical efficient management practices:

(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).

(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.

(c) Agricultural water suppliers shall implement additional efficient management practices, including, but not limited to, practices to accomplish all of the following, if the measures are locally cost effective and technically feasible:

(1) Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.

(2) Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.

(3) Facilitate the financing of capital improvements for on-farm irrigation systems.

(4) Implement an incentive pricing structure that promotes one or more of the following goals:

(A) More efficient water use at the farm level.

(B) Conjunctive use of groundwater.

(C) Appropriate increase of groundwater recharge.

(D) Reduction in problem drainage.

(E) Improved management of environmental resources.

(F) Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions.

(5) Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.

(6) Increase flexibility in water ordering by, and delivery to, water customers within operational limits.

(7) Construct and operate supplier spill and tailwater recovery systems.

(8) Increase planned conjunctive use of surface water and groundwater within the supplier service area.

(9) Automate canal control structures.

(10) Facilitate or promote customer pump testing and evaluation.

(11) Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.

(12) Provide for the availability of water management services to water users. These services may include, but are not limited to, all of the following:

(A) On-farm irrigation and drainage system evaluations.

(B) Normal year and real-time irrigation scheduling and crop evapotranspiration information.

(C) Surface water, groundwater, and drainage water quantity and quality data.

(D) Agricultural water management educational programs and materials for farmers, staff, and the public.

(13) Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.

(14) Evaluate and improve the efficiencies of the supplier’s

pumps.

(d) Agricultural water suppliers shall include in the agricultural water management plans required pursuant to Part 2.8 (commencing with Section 10800) a report on which efficient water management practices have been implemented and are planned to be implemented, an estimate of the water use efficiency improvements that have occurred since the last report, and an estimate of the water use efficiency improvements estimated to occur five and 10 years in the future. If an agricultural water supplier determines that an efficient water management practice is not locally cost effective or technically feasible, the supplier shall submit information documenting that determination.

(e) The department shall require information about the implementation of efficient water management practices to be reported using a standardized form developed pursuant to Section 10608.52. (f) An agricultural water supplier may meet the requirements of subdivisions (d) and (e) by submitting to the department a water conservation plan submitted to the United States Bureau of Reclamation that meets the requirements described in Section 10828.

(f) On or before December 31, 2013, December 31, 2016, and December 31, 2021, the department, in consultation with the board, shall submit to the Legislature a report on the agricultural efficient water management practices that have been implemented and are planned to be implemented and an assessment of the manner in which the implementation of those efficient water management practices has affected and will affect agricultural operations, including estimated water use efficiency improvements, if any.

(g) The department may update the efficient water management practices required pursuant to subdivision (c), in consultation with the Agricultural Water Management Council, the United States Bureau of Reclamation, and the board. All efficient water management practices for agricultural water use pursuant to this chapter shall be adopted or revised by the department only after the department conducts public hearings to allow participation of the diverse geographical areas and interests of the state.

(h) (1) The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

CHAPTER 5. Sustainable Water Management [10608.50]

10608.50. (a) The department, in consultation with the board, shall promote implementation of regional water resources management practices through increased incentives and removal of barriers consistent with state and federal law. Potential changes may include, but are not limited to, all of the following:

(1) Revisions to the requirements for urban and agricultural water management plans.

(2) Revisions to the requirements for integrated regional water management plans.

(3) Revisions to the eligibility for state water management grants and loans.

(4) Revisions to state or local permitting requirements that increase water supply opportunities, but do not weaken water quality protection under state and federal law.

(5) Increased funding for research, feasibility studies, and project construction.

(6) Expanding technical and educational support for local land use and water management agencies.

(b) No later than January 1, 2011, and updated as part of the California Water Plan, the department, in consultation with the board, and with public input, shall propose new statewide targets, or review and update existing statewide targets, for regional water resources management practices, including, but not limited to, recycled water, brackish groundwater desalination, and infiltration and direct use of urban stormwater runoff.

CHAPTER 6. Standardized Data Collection [10608.52]

10608.52. (a) The department, in consultation with the board, the California Bay-Delta Authority or its successor agency, the State Department of Public Health, and the Public Utilities Commission, shall develop a single standardized water use reporting form to meet the water use information needs of each agency, including the needs of urban water suppliers that elect to determine and report progress toward achieving targets on a regional basis as provided in subdivision (a) of Section 10608.28.

(b) At a minimum, the form shall be developed to accommodate information sufficient to assess an urban water supplier's compliance with conservation targets pursuant to Section 10608.24 and an agricultural water supplier's compliance with implementation of efficient water management practices pursuant to subdivision (a) of Section 10608.48. The form shall accommodate reporting by urban water suppliers on an individual or regional basis as provided in subdivision (a) of Section 10608.28.

CHAPTER 7. Funding Provisions [10608.56 – 10608.60]

10608.56. (a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(b) On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(d) Notwithstanding subdivision (b), the department shall determine that an agricultural water supplier is eligible for a water grant or loan even though the supplier is not implementing all of the efficient water management practices described in Section 10608.48, if the agricultural water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices. The supplier may request grant or loan funds to implement the efficient water management practices to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.

(f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).

10608.60. (a) It is the intent of the Legislature that funds made available by Section 75026 of the Public Resources Code should be expended, consistent with Division 43 (commencing with Section 75001) of the Public

Resources Code and upon appropriation by the Legislature, for grants to implement this part. In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part.

(b) It is the intent of the Legislature that funds made available by Section 75041 of the Public Resources Code, should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for direct expenditures to implement this part.

CHAPTER 8. Quantifying Agricultural Water Use Efficiency [10608.64]

10608.64. The department, in consultation with the Agricultural Water Management Council, academic experts, and other stakeholders, shall develop a methodology for quantifying the efficiency of agricultural water use. Alternatives to be assessed shall include, but not be limited to, determination of efficiency levels based on crop type or irrigation system distribution uniformity. On or before December 31, 2011, the department shall report to the Legislature on a proposed methodology and a plan for implementation. The plan shall include the estimated implementation costs and the types of data needed to support the methodology. Nothing in this section authorizes the department to implement a methodology established pursuant to this section.

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 – 10609.42]

CHAPTER 9. Urban Water Use Objectives and Water Use Reporting [10609 – 10609.38]

10609. (a) The Legislature finds and declares that this chapter establishes a method to estimate the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently. This estimated aggregate water use is the urban retail water supplier’s urban water use objective. The method is based on water use efficiency standards and local service area characteristics for that year. By comparing the amount of water actually used in the previous year with the urban water use objective, local urban water suppliers will be in a better position to help eliminate unnecessary use of water; that is, water used in excess of that needed to accomplish the intended beneficial use.

(b) The Legislature further finds and declares all of the following:

(1) This chapter establishes standards and practices for the following water uses:

(A) Indoor residential use.

(B) Outdoor residential use.

(C) CII water use.

(D) Water losses.

(E) Other unique local uses and situations that can have a material effect on an urban water supplier's total water use.

(2) This chapter further does all of the following:

(A) Establishes a method to calculate each urban water use objective.

(B) Considers recycled water quality in establishing efficient irrigation standards.

(C) Requires the department to provide or otherwise identify data regarding the unique local conditions to support the calculation of an urban water use objective.

(D) Provides for the use of alternative sources of data if alternative sources are shown to be as accurate as, or more accurate than, the data provided by the department.

(E) Requires annual reporting of the previous year's water use with the urban water use objective.

(F) Provides a bonus incentive for the amount of potable recycled water used the previous year when comparing the previous year's water use with the urban water use objective, of up to 10 percent of the urban water use objective.

(3) This chapter requires the department and the board to solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter.

(4) This chapter preserves the Legislature's authority over long-term water use efficiency target setting and ensures appropriate legislative oversight of the implementation of this chapter by doing all of the following:

(A) Requiring the Legislative Analyst to conduct a review of the implementation of this chapter, including compliance with the adopted standards and regulations, accuracy of the data, use of alternate data, and other issues the Legislative Analyst deems appropriate.

(B) Stating legislative intent that the director of the department and the chairperson of the board appear before the appropriate Senate and Assembly policy committees to report on progress in implementing this chapter.

(C) Providing one-time-only authority to the department and board to adopt water use efficiency standards, except as explicitly provided in this chapter. Authorization to update the standards shall require separate legislation.

(c) It is the intent of the Legislature that the following principles apply to the development and implementation of long-term standards and urban water use objectives:

(1) Local urban retail water suppliers should have primary responsibility for meeting standards-based water use targets, and they shall retain the flexibility to develop their water supply portfolios, design and implement water conservation strategies, educate their customers, and enforce their rules.

(2) Long-term standards and urban water use objectives should advance the state's goals to mitigate and adapt to climate change.

(3) Long-term standards and urban water use objectives should acknowledge the shade, air quality, and heat-island reduction benefits provided to communities by trees through the support of water-efficient irrigation practices that keep trees healthy.

(4) The state should identify opportunities for streamlined reporting, eliminate redundant data submissions, and incentivize open access to data collected by urban and agricultural water suppliers.

10609.2. (a) The board, in coordination with the department, shall adopt long-term standards for the efficient use of water pursuant to this chapter on or before June 30, 2022.

(b) Standards shall be adopted for all of the following:

(1) Outdoor residential water use.

(2) Outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.

(3) A volume for water loss.

(c) When adopting the standards under this section, the board shall consider the policies of this chapter and the proposed efficiency standards' effects on local wastewater management, developed and natural parklands, and urban tree health. The standards and potential effects shall be identified by May 30, 2022. The board shall allow for public comment on potential effects identified by the board under this subdivision.

(d) The long-term standards shall be set at a level designed so that the water use objectives, together with other demands excluded from the long-term standards such as CII indoor water use and CII outdoor water use not connected to a dedicated landscape meter, would exceed the statewide conservation targets required pursuant to Chapter 3 (commencing with Section 10608.16).

(e) The board, in coordination with the department, shall adopt by regulation variances recommended by the department pursuant to Section 10609.14 and guidelines and methodologies pertaining to the calculation of an urban retail water supplier's urban water use objective recommended by the department pursuant to Section 10609.16.

10609.4. (a) (1) Until January 1, 2025, the standard for indoor residential water use shall be 55 gallons per capita daily.

(2) Beginning January 1, 2025, and until January 1, 2030, the

standard for indoor residential water use shall be the greater of 52.5 gallons per capita daily or a standard recommended pursuant to subdivision (b).

(3) Beginning January 1, 2030, the standard for indoor residential water use shall be the greater of 50 gallons per capita daily or a standard recommended pursuant to subdivision (b).

(b) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and may jointly recommend to the Legislature a standard for indoor residential water use that more appropriately reflects best practices for indoor residential water use than the standard described in subdivision (a). A report on the results of the studies and investigations shall be made to the chairpersons of the relevant policy committees of each house of the Legislature by January 1, 2021, and shall include information necessary to support the recommended standard, if there is one. The studies and investigations shall also include an analysis of the benefits and impacts of how the changing standard for indoor residential water use will impact water and wastewater management, including potable water usage, wastewater, recycling and reuse systems, infrastructure, operations, and supplies.

(2) The studies, investigations, and report described in paragraph (1) shall include collaboration with, and input from, a broad group of stakeholders, including, but not limited to, environmental groups, experts in indoor plumbing, and water, wastewater, and recycled water agencies.

10609.6. (a) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor residential use for adoption by the board in accordance with this chapter.

(2) (A) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(B) The standards shall apply to irrigable lands.

(C) The standards shall include provisions for swimming pools, spas, and other water features. Ornamental water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, shall be analyzed separately from swimming pools and spas.

(b) The department shall, by January 1, 2021, provide each urban retail water supplier with data regarding the area of residential irrigable lands in a manner that can reasonably be applied to the standards adopted pursuant to this section.

(c) The department shall not recommend standards pursuant to this section until it has conducted pilot projects or studies, or some combination of the two, to ensure that the data provided to local agencies are reasonably accurate for the data's intended uses, taking into consideration California's diverse landscapes and community characteristics.

10609.8. (a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor irrigation of landscape areas with dedicated irrigation meters or other means of calculating outdoor irrigation use in connection with CII water use for adoption by the board in accordance with this chapter.

(b) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(c) The standards shall include an exclusion for water for commercial agricultural use meeting the definition of subdivision (b) of Section 51201 of the Government Code.

10609.9. For purposes of Sections 10609.6 and 10609.8, "principles of the model water efficient landscape ordinance" means those provisions of the model water efficient landscape ordinance applicable to the establishment or determination of the amount of water necessary to efficiently irrigate both new and existing landscapes. These provisions include, but are not limited to, all of the following:

(a) Evapotranspiration adjustment factors, as applicable.

(b) Landscape area.

(c) Maximum applied water allowance.

(d) Reference evapotranspiration.

(e) Special landscape areas, including provisions governing evapotranspiration adjustment factors for different types of water used for irrigating the landscape.

10609.10. (a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, performance measures for CII water use for adoption by the board in accordance with this chapter.

(b) Prior to recommending performance measures for CII water use, the department shall solicit broad public participation from stakeholders and other interested persons relating to all of the following:

(1) Recommendations for a CII water use classification system for California that address significant uses of water.

(2) Recommendations for setting minimum size thresholds for converting mixed CII meters to dedicated irrigation meters, and evaluation of, and recommendations for, technologies that could be used in lieu of requiring dedicated irrigation meters.

(3) Recommendations for CII water use best management practices, which may include, but are not limited to, water audits and water management plans for those CII customers that exceed a recommended size, volume of water use, or other threshold.

(c) Recommendations of appropriate performance measures for CII water use shall be consistent with the October 21, 2013, report to the Legislature by the Commercial, Industrial, and Institutional Task Force entitled "Water Use Best Management Practices," including the technical and financial feasibility recommendations provided in that report, and shall support the economic productivity of California's commercial, industrial, and institutional sectors.

(d) (1) The board, in coordination with the department, shall adopt performance measures for CII water use on or before June 30, 2022.

(a) Each urban retail water supplier shall implement the performance measures adopted by the board pursuant to paragraph (1).

10609.12. The standards for water loss for urban retail water suppliers shall be the standards adopted by the board pursuant to subdivision (i) of Section 10608.34.

10609.14. (a) The department, in coordination with the board, shall conduct necessary studies and investigations and, no later than October 1, 2021, recommend for adoption by the board in accordance with this chapter appropriate variances for unique uses that can have a material effect on an urban retail water supplier's urban water use objective.

(b) Appropriate variances may include, but are not limited to, allowances for the following:

(1) Significant use of evaporative coolers.

(2) Significant populations of horses and other livestock.

(3) Significant fluctuations in seasonal populations.

(4) Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.

(5) Significant use of water for soil compaction and dust control.

(6) Significant use of water to supplement ponds and lakes to sustain wildlife.

(7) Significant use of water to irrigate vegetation for fire protection.

(8) Significant use of water for commercial or noncommercial agricultural use.

(c) The department, in recommending variances for adoption by the board, shall also recommend a threshold of significance for each recommended variance.

(d) Before including any specific variance in calculating an urban retail water supplier's water use objective, the urban retail water supplier shall request and receive approval by the board for the inclusion of that variance.

(e) The board shall post on its Internet Web site all of the following:

(1) A list of all urban retail water suppliers with approved variances.

(2) The specific variance or variances approved for each urban retail water supplier.

(3) The data supporting approval of each variance.

10609.15. To help streamline water data reporting, the department and the board shall do all of the following:

(a) Identify urban water reporting requirements shared by both agencies, and post on each agency's Internet Web site how the data is used for planning, regulatory, or other purposes.

(b) Analyze opportunities for more efficient publication of urban water reporting requirements within each agency, and analyze how each agency can integrate various data sets in a publicly accessible location, identify priority actions, and implement priority actions identified in the analysis.

(c) Make appropriate data pertaining to the urban water reporting requirements that are collected by either agency available to the public according to the principles and requirements of the Open and Transparent Water Data Act (Part 4.9 (commencing with Section 12400)).

10609.16. The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, guidelines and methodologies for the board to adopt that identify how an urban retail water supplier calculates its urban water use objective. The guidelines and methodologies shall address, as necessary, all of the following:

(a) Determining the irrigable lands within the urban retail water supplier's service area.

(b) Updating and revising methodologies described pursuant to subparagraph (A) of paragraph (1) of subdivision (h) of Section 10608.20, as appropriate, including methodologies for calculating the population in an urban retail water supplier's service area.

(c) Using landscape area data provided by the department or alternative data.

(d) Incorporating precipitation data and climate data into estimates of a urban retail water supplier's outdoor irrigation budget for its urban water use objective.

(e) Estimating changes in outdoor landscape area and population, and calculating the urban water use objective, for years when updated landscape imagery is not available from the department.

(f) Determining acceptable levels of accuracy for the supporting data, the urban water use objective, and compliance with the urban water use objective.

10609.18. The department and the board shall solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter. The board shall hold at least one public meeting before taking any action on any standard or variance recommended by the department.

10609.20. (a) Each urban retail water supplier shall calculate its urban water use objective no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use conditions for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use objective shall be composed of the sum of the following:

(1) Aggregate estimated efficient indoor residential water use.

(2) Aggregate estimated efficient outdoor residential water use.

(3) Aggregate estimated efficient outdoor irrigation of landscape areas with dedicated irrigation meters or equivalent technology in connection with CII water use.

(4) Aggregate estimated efficient water losses.

(5) Aggregate estimated water use in accordance with variances, as appropriate.

(d) (1) An urban retail water supplier that delivers water from a groundwater basin, reservoir, or other source that is augmented by potable reuse water may adjust its urban water use objective by a bonus incentive calculated pursuant to this subdivision.

(2) The water use objective bonus incentive shall be the volume of its potable reuse delivered to residential water users and to landscape areas with dedicated irrigation meters in connection with CII water use, on an acre-foot basis.

(3) The bonus incentive pursuant to paragraph (1) shall be limited in accordance with one of the following:

(A) The bonus incentive shall not exceed 15 percent of the urban water supplier's water use objective for any potable reuse water produced at an existing facility.

(B) The bonus incentive shall not exceed 10 percent of the urban water supplier's water use objective for any potable reuse water produced at any facility that is not an existing facility.

(4) For purposes of this subdivision, "existing facility" means a facility that meets all of the following:

(A) The facility has a certified environmental impact report, mitigated negative declaration, or negative declaration on or before January 1, 2019.

(B) The facility begins producing and delivering potable reuse water on or before January 1, 2022.

(C) The facility uses microfiltration and reverse osmosis technologies to produce the potable reuse water.

(e) (1) The calculation of the urban water use objective shall be made using landscape area and other data provided by the department and pursuant to the standards, guidelines, and methodologies adopted by the board. The department shall provide data to the urban water supplier at a level of detail sufficient to allow the urban water supplier to verify its accuracy at the parcel level.

(2) Notwithstanding paragraph (1), an urban retail water supplier may use alternative data in calculating the urban water use objective if the supplier demonstrates to the department that the alternative data are equivalent, or superior, in quality and accuracy to the data provided by the department. The department may provide technical assistance to an urban retail water supplier in evaluating whether the alternative data are appropriate for use in calculating the supplier's urban water use objective.

10609.21. (a) For purposes of Section 10609.20, and notwithstanding paragraph (4) of subdivision (d) of Section 10609.20, "existing facility" also includes the North City Project, phase one of the Pure Water San Diego Program, for which an environmental impact report was certified on April 10, 2018.

(b) This section shall become operative on January 1, 2019.

10609.22. (a) An urban retail water supplier shall calculate its actual urban water use no later than January 1, 2024, and by January 1 every year thereafter.

(b) The calculation shall be based on the urban retail water supplier's water use for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use shall be composed of the sum of the following:

(1) Aggregate residential water use.

(2) Aggregate outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.

(3) Aggregate water losses.

10609.24. (a) An urban retail water supplier shall submit a report to the department no later than January 1, 2024, and by January 1 every year thereafter. The report shall include all of the following:

(1) The urban water use objective calculated pursuant to Section 10609.20 along with relevant supporting data.

(2) The actual urban water use calculated pursuant to Section 10609.22 along with relevant supporting data.

(3) Documentation of the implementation of the performance measures for CII water use.

(4) A description of the progress made towards meeting the urban water use objective.

(5) The validated water loss audit report conducted pursuant to Section 10608.34.

(b) The department shall post the reports and information on its internet website.

(c) The board may issue an information order or conservation order to, or impose civil liability on, an entity or individual for failure to submit a report required by this section.

10609.25. As part of the first report submitted to the department by an urban retail water supplier no later than January 1, 2024, pursuant to subdivision (a) of Section 10609.24, each urban retail water supplier shall provide a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027.

10609.26. (a) (1) On and after January 1, 2024, the board may issue informational orders pertaining to water production, water use, and water conservation to an urban retail water supplier that does not meet its urban water use objective required by this chapter. Informational orders are intended to obtain information on supplier activities, water production, and conservation efforts in order to identify technical assistance needs and assist urban water suppliers in meeting their urban water use objectives.

(2) In determining whether to issue an informational order, the board shall consider the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet the urban water use objective.

(3) The board shall share information received pursuant to this subdivision with the department.

(4) An urban water supplier may request technical assistance from the department. The technical assistance may, to the extent available, include guidance documents, tools, and data.

(b) On and after January 1, 2025, the board may issue a written notice to an urban retail water supplier that does not meet its urban water use objective required by this chapter. The written notice may warn the urban retail water supplier that it is not meeting its urban water use objective described in Section 10609.20 and is not making adequate progress in meeting the urban water use objective, and may request that the urban retail water supplier address areas of concern in its next annual report required by Section 10609.24. In deciding whether to issue a written notice, the board may consider whether the urban retail water supplier has received an informational order, the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet its urban water use objective.

(c) (1) On and after January 1, 2026, the board may issue a conservation order to an urban retail water supplier that does not meet its urban water use objective. A conservation order may consist of, but is not limited to, referral to the department for technical assistance, requirements for education and outreach, requirements for local enforcement, and other efforts to assist urban retail water suppliers in meeting their urban water use objective.

(2) In issuing a conservation order, the board shall identify specific deficiencies in an urban retail water supplier's progress towards meeting its urban water use objective, and identify specific actions to address the deficiencies.

(3) The board may request that the department provide an urban retail water supplier with technical assistance to support the urban retail water supplier's actions to remedy the deficiencies.

(d) A conservation order issued in accordance with this chapter may include requiring actions intended to increase water-use efficiency, but shall not curtail or otherwise limit the exercise of a water right, nor shall it require the imposition of civil liability pursuant to Section 377.

10609.27. Notwithstanding Section 10609.26, the board shall not issue an information order, written notice, or conservation order pursuant to Section 10609.26 if both of the following conditions are met:

(a) The board determines that the urban retail water supplier is not meeting its urban water use objective solely because the volume of water loss exceeds the urban retail water supplier's standard for water loss.

(b) Pursuant to Section 10608.34, the board is taking enforcement action against the urban retail water supplier for not meeting the performance standards for the volume of water losses.

10609.28. The board may issue a regulation or informational order requiring a wholesale water supplier, an urban retail water supplier, or a distributor of a public water supply, as that term is used in Section 350, to provide a monthly report relating to water production, water use, or water conservation.

10609.30. On or before January 10, 2024, the Legislative Analyst shall provide to the appropriate policy committees of both houses of the Legislature and the public a report evaluating the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. The board and the department shall provide the Legislative Analyst with the available data to complete this report.

(a) The report shall describe all of the following:

(1) The rate at which urban retail water users are complying with the standards, and factors that might facilitate or impede their compliance.

(2) The accuracy of the data and estimates being used to calculate urban water use objectives.

(3) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.

(4) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.

(5) The early indications of how implementing this chapter might impact the efficiency of statewide urban water use.

(6) Recommendations, if any, for improving statewide urban water use efficiency and the standards and practices described in this chapter.

(7) Any other issues the Legislative Analyst deems appropriate.

10609.32. It is the intent of the Legislature that the chairperson of the board and the director of the department appear before the appropriate policy committees of both houses of the Legislature on or around January 1, 2026, and report on the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. It is the intent of the Legislature that the topics to be covered include all of the following:

(a) The rate at which urban retail water suppliers are complying with the standards, and factors that might facilitate or impede their compliance.

(b) What enforcement actions have been taken, if any.

(c) The accuracy of the data and estimates being used to calculate urban water use objectives.

(d) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.

(e) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.

(f) An assessment of how implementing this chapter is affecting the efficiency of statewide urban water use.

10609.34. Notwithstanding Section 15300.2 of Title 14 of the California Code of Regulations, an action of the board taken under this chapter shall be deemed to be a Class 8 action, within the meaning of Section 15308 of Title 14 of the California Code of Regulations, provided that the action does not involve relaxation of existing water conservation or water use standards.

10609.36. (a) Nothing in this chapter shall be construed to determine or alter water rights. Sections 1010 and 1011 apply to water conserved through implementation of this chapter.

(b) Nothing in this chapter shall be construed to authorize the board to update or revise water use efficiency standards authorized by this chapter except as explicitly provided in this chapter. Authorization to update the standards beyond that explicitly provided in this chapter shall require separate legislation.

(c) Nothing in this chapter shall be construed to limit or otherwise affect the use of recycled water as seawater barriers for groundwater salinity management.

10609.38. The board may waive the requirements of this chapter for a period of up to five years for any urban retail water supplier whose water deliveries are significantly affected by changes in water use as a result of damage from a disaster such as an earthquake or fire. In establishing the period of a waiver, the board shall take into consideration the breadth of the damage and the time necessary for the damaged areas to recover from the disaster.

PART 2.6. URBAN WATER MANAGEMENT PLANNING

CHAPTER 1. General Declaration and Policy [10610 – 10610.4]

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

(1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.

(2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.

(3) A long-term, reliable supply of water is essential to protect the productivity of California’s businesses and economic climate, and increasing long-term water conservation among Californians, improving water use efficiency within the state’s communities and agricultural production, and strengthening local and regional drought planning are critical to California’s resilience to drought and climate change.

(4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years now and into the

foreseeable future, and every urban water supplier should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning.

(5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.

(6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

(7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.

(8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.

(9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.

(b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

(a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.

(b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.

(c) Urban water suppliers shall be required to develop water management plans to achieve the efficient use of available supplies and strengthen local drought planning.

CHAPTER 2. Definitions [10611 – 10618]

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.3. “Customer” means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.

10611.5. “Demand management” means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.

10612. “Drought risk assessment” means a method that examines water shortage risks based on the driest five-year historic sequence for the agency’s water supply, as described in subdivision (b) of Section 10635.

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

10617.5. “Water shortage contingency plan” means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.

10618. “Water supply and demand assessment” means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.

CHAPTER 3. Urban Water Management Plans

ARTICLE 1. General Provisions [10620 – 10621]

10620. (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

(b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.

(c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.

(d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation, efficient water use, and improved local drought resilience.

(2) Notwithstanding paragraph (1), each urban water supplier shall develop its own water shortage contingency plan, but an urban water supplier may incorporate, collaborate, and otherwise share information with other urban water suppliers or other governing entities participating in an areawide, regional, watershed, or basinwide urban water management plan, an agricultural management plan, or groundwater sustainability plan development.

(3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

(e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.

(f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621. (a) Each urban water supplier shall update its plan at least once every five years on or before July 1, in years ending in six and one, incorporating updated and new information from the five years preceding each update.

(b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.

(c) An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.

(d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).

(e) Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.

(f) Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.

CHAPTER 3. Urban Water Management Plans

ARTICLE 2. Contents of Plans [10630 – 10634]

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, while accounting for impacts from climate change.

10630.5. Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.

10631. A plan shall be adopted in accordance with this chapter that shall do all of the following:

(a) Describe the service area of the supplier, including current and projected population, climate, and other social, economic, and demographic factors affecting the supplier's water management planning. The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available. The description shall include the current and projected land uses within the existing or anticipated service area affecting the supplier's water management planning. Urban water suppliers shall coordinate with local or regional land use authorities to determine the most appropriate land use information, including, where appropriate, land use information obtained from local or regional land use authorities, as developed pursuant to Article 5 (commencing with Section 65300) of Chapter 3 of Division 1 of Title 7 of the Government Code.

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a), providing supporting and related information, including all of the following:

(1) A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.

(2) When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.

(3) For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.

(4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information:

(A) The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier’s service area.

(B) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater.

For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For a basin that has not been adjudicated, information as to whether the department has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).

(C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(c) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

(d) (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:

(A) Single-family residential.

(B) Multifamily.

(C) Commercial.

(D) Industrial.

(E) Institutional and governmental.

(F) Landscape.

(G) Sales to other agencies.

(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.

(I) Agricultural.

(J) Distribution system water loss.

(2) The water use projections shall be in the same five-year increments described in subdivision (a).

(3) (A) The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.

(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

(C) In the plan due July 1, 2021, and in each update thereafter, data shall be included to show whether the urban retail water supplier met the distribution loss standards enacted by the board pursuant to Section 10608.34.

(4) (A) Water use projections, where available, shall display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.

(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following:

(i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.

(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

(e) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) (A) For an urban retail water supplier, as defined in Section 10608.12, a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years. The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

(B) The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:

(i) Water waste prevention ordinances.

(ii) Metering.

(iii) Conservation pricing.

(iv) Public education and outreach.

(v) Programs to assess and manage distribution system real loss.

(vi) Water conservation program coordination and staffing support.

(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.

(2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.

(f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in normal and single-dry water years and for a period of drought lasting five consecutive water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.

(g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

(h) An urban water supplier that relies upon a wholesale agency for a source of water shall provide the wholesale agency with water use projections from that agency for that source of water in five-year increments to 20 years or as far as data is available. The wholesale agency shall provide information to the urban water supplier for inclusion in the urban water supplier’s plan that identifies and quantifies, to the extent practicable, the existing and planned sources of water as required by subdivision (b), available from the wholesale agency to the urban water supplier over the same five-year increments, and during various water-year types in accordance with subdivision (f). An urban water supplier may rely upon water supply information provided by the wholesale agency in fulfilling the plan informational requirements of subdivisions (b) and (f).

10631.1. (a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

(b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.2. (a) In addition to the requirements of Section 10631, an urban water management plan shall include any of the following information that the urban water supplier can readily obtain:

(1) An estimate of the amount of energy used to extract or divert water supplies.

(2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.

(3) An estimate of the amount of energy used to treat water supplies.

(4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.

(5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.

(6) An estimate of the amount of energy used to place water into or withdraw from storage.

(7) Any other energy-related information the urban water supplier deems appropriate.

(b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

10632. (a) Every urban water supplier shall prepare and adopt a water shortage contingency plan as part of its urban water management plan that consists of each of the following elements:

(1) The analysis of water supply reliability conducted pursuant to Section 10635.

(2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:

(A) The written decision making process that an urban water supplier will use each year to determine its water supply reliability.

(B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:

(i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.

(ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.

(iii) Existing infrastructure capabilities and plausible constraints.

(iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.

(v) A description and quantification of each source of water supply.

(3) (A) Six standard water shortage levels corresponding to progressive ranges of up to 10, 20, 30, 40, and 50 percent shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other potential emergency events.

(B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.

(4) Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:

(A) Locally appropriate supply augmentation actions.

(B) Locally appropriate demand reduction actions to adequately respond to shortages.

(C) Locally appropriate operational changes.

(D) Additional, mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions and appropriate to the local conditions.

(E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.

(5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:

(A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.

(B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.

(C) Any other relevant communications.

(6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.

(7) (A) A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.

(A) A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.

(B) A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.

(8) A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:

(A) A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(B) A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).

(C) A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.

(9) For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.

(10) Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.

(b) For purposes of developing the water shortage contingency plan pursuant to subdivision (a), an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

(c) The urban water supplier shall make available the water shortage contingency plan prepared pursuant to this article to its customers and any city or county within which it provides water supplies no later than 30 days after adoption of the water shortage contingency plan.

10632.1. An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier’s water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.

10632.2. An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan, as identified in subdivision (a) of Section 10632, or reasonable alternative actions, provided that descriptions of the alternative actions are submitted with the annual water shortage assessment report pursuant to Section 10632.1. Nothing in this section prohibits an urban water supplier from taking actions not specified in its water shortage contingency plan, if needed, without having to formally amend its urban water management plan or water shortage contingency plan.

10632.3. It is the intent of the Legislature that, upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the board defer to implementation of locally adopted water shortage contingency plans to the extent practicable.

10632.5. (a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the serv`ice area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier’s service area, and shall include all of the following:

(a) A description of the wastewater collection and treatment systems in the supplier’s service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.

(b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.

(c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.

(d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.

(e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

(f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.

(g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

CHAPTER 3. Urban Water Management Plans

ARTICLE 2.5. Water Service Reliability [10635]

10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the long-term total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and a drought lasting five consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

(b) Every urban water supplier shall include, as part of its urban water management plan, a drought risk assessment for its water service to its customers as part of information considered in developing the demand management measures and water supply projects and programs to be included in the urban water management plan. The urban water supplier may conduct an interim update or updates to this drought risk assessment within the five-year cycle of its urban water management plan update. The drought risk assessment shall include each of the following:

(1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.

(2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.

(3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.

(4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate

change conditions, anticipated regulatory changes, and other locally applicable criteria.

(d) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

(e) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.

(f) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

CHAPTER 3. Urban Water Management Plans

ARTICLE 3. Adoption and Implementation of Plans [10640 – 10645]

10640. (a) Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

(b) Every urban water supplier required to prepare a water shortage contingency plan shall prepare a water shortage contingency plan pursuant to Section 10632. The supplier shall likewise periodically review the water shortage contingency plan as required by paragraph (10) of subdivision (a) of Section 10632 and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a plan or a water shortage contingency plan may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of both the plan and the water shortage contingency plan. Prior to adopting either, the urban water supplier shall make both the plan and the water shortage contingency plan available for public inspection and shall hold a public hearing or hearings thereon. Prior to any of these hearings, notice of the time and place of the hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of a hearing to any city or county within which the supplier provides water supplies. Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644. (a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

(b) If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.

(c) (1) (A) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before July 1, in the years ending in seven and two, a report summarizing the status of the plans and water shortage contingency plans adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans and water shortage contingency plans. The department shall provide a copy of the report to each urban water supplier that has submitted its plan and water shortage contingency plan to the department. The department shall also prepare reports and provide data for any legislative hearings designed to consider the effectiveness of plans and water shortage contingency plans submitted pursuant to this part.

(B) The department shall prepare and submit to the board, on or before September 30 of each year, a report summarizing the submitted water supply and demand assessment results along with appropriate reported water shortage conditions and the regional and statewide analysis of water supply conditions developed by the department. As part of the report, the department shall provide a summary and, as appropriate, urban water supplier specific information regarding various shortage response actions implemented as a result of annual supplier-specific water supply and demand assessments performed pursuant to Section 10632.1.

(C) The department shall submit the report to the Legislature for the 2015 plans by July 1, 2017, and the report to the Legislature for the 2020 plans and water shortage contingency plans by July 1, 2022.

(2) A report to be submitted pursuant to subparagraph (A) of paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

(d) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

10645. (a) Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

(b) Not later than 30 days after filing a copy of its water shortage contingency plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

CHAPTER 4. Miscellaneous Provisions [10650 – 10657]

10650. Any actions or proceedings, other than actions by the board, to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

(a) An action or proceeding alleging failure to adopt a plan or a water shortage contingency plan shall be commenced within 18 months after that adoption is required by this part.

(b) Any action or proceeding alleging that a plan or water shortage contingency plan, or action taken pursuant to either, does not comply with this part shall be commenced within 90 days after filing of the plan or water shortage contingency plan or an amendment to either pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan or a water shortage contingency plan, or an action taken pursuant to either by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the board and the Public Utilities Commission, for the preparation of water management plans, water shortage contingency plans, or conservation plans; provided, that if the board or the Public Utilities Commission requires additional information concerning water conservation, drought response measures, or financial conditions to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan that complies with analogous federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its urban water management plan, its drought risk assessment, its water supply and demand assessment, and its water shortage contingency plan and implementing the reasonable water conservation measures included in either of the plans.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier is not eligible for a water grant or loan awarded or administered by the state unless the urban water supplier complies with this part.

10657. The department may adopt regulations regarding the definitions of water, water use, and reporting periods, and may adopt any other regulations deemed necessary or desirable to implement this part. In developing regulations pursuant to this section, the department shall solicit broad public participation from stakeholders and other interested persons.

Appendix C

California Water Code

Sustainable Water Use and Demand Reduction (SB X7-7)

The following was included in the City of Corona 2015 UWMP as Appendix C. This document presents the Water Code sections associated with the Sustainable Water Use and Demand Reduction (SB X7-7).

California Water Code
Sustainable Water Use and Demand Reduction

California Water Code Division 6, Part 2.55.

Chapter 1. General Declarations and Policy §10608-10608.8
Chapter 2. Definitions §10608.12
Chapter 3. Urban Retail Water Suppliers §10608.16-10608.44
Chapter 4. Agricultural Water Suppliers §10608.48
Chapter 5. Sustainable Water Management §10608.50
Chapter 6 Standardized Data Collection §10608.52
Chapter 7 Funding Provisions §10608.56-10608.60
Chapter 8 Quantifying Agricultural Water Use Efficiency §10608.64

Chapter 1. General Declarations and Policy

SECTION 10608-10608.8

10608. The Legislature finds and declares all of the following:

(a) Water is a public resource that the California Constitution protects against waste and unreasonable use.

(b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.

(c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.

(d) Reduced water use through conservation provides significant energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

(e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.

(f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.

(g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.

(h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.

(i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

10608.4. It is the intent of the Legislature, by the enactment of this part, to do all of the following:

(a) Require all water suppliers to increase the efficiency of use of this essential resource.

(b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.

(c) Measure increased efficiency of urban water use on a per capita basis.

(d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.

(e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.

(f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.

(g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.

(h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.

(i) Require implementation of specified efficient water management practices for agricultural water suppliers.

(j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.

(k) Advance regional water resources management.

10608.8. (a) (1) Water use efficiency measures adopted and implemented pursuant to this part or Part 2.8 (commencing with Section 10800) are water conservation measures subject to the protections provided under Section 1011.

(2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.

(3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.

(b) This part does not limit or otherwise affect the application of Chapter 3.5 (commencing with Section 11340), Chapter 4 (commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

(c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.

(d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

Chapter 2 Definitions

SECTION 10608.12

10608.12. Unless the context otherwise requires, the following definitions govern the construction of this part:

(a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.

(b) "Base daily per capita water use" means any of the following:

(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10- year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

(c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.

(d) "Commercial water user" means a water user that provides or distributes a product or service.

(e) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.

(f) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.

(g) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:

(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.

(2) The net volume of water that the urban retail water supplier places into long- term storage.

(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.

(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.

(h) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.

(i) "Institutional water user" means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.

(j) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.

(k) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.

(l) "Process water" means water used for producing a product or product content or water used for research and development, including, but not limited to, continuous manufacturing processes, water used for testing and maintaining equipment used in producing a product or product content, and water used in combined heat and power facilities used in producing a product or product content. Process water does not mean incidental water uses not related to the production of a product or product content, including, but not limited to, water used for restrooms, landscaping, air conditioning, heating, kitchens, and laundry.

(m) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050, that is used to offset potable demand, including recycled water supplied for direct use and indirect potable reuse, that meets the following requirements, where applicable:

(1) For groundwater recharge, including recharge through spreading basins, water supplies that are all of the following:

(A) Metered.

(B) Developed through planned investment by the urban water supplier or a wastewater treatment agency.

(C) Treated to a minimum tertiary level.

(D) Delivered within the service area of an urban retail water supplier or its urban wholesale water supplier that helps an urban retail water supplier meet its urban water use target.

(2) For reservoir augmentation, water supplies that meet the criteria of paragraph (1) and are conveyed through a distribution system constructed specifically for recycled water.

(j) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable local water reliability or any of the following alternative sources of water:

(1) The capture and reuse of stormwater or rainwater.

(2) The use of recycled water.

(3) The desalination of brackish groundwater.

(4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

(k) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(l) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

(m) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(n) "Urban wholesale water supplier," means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

Chapter 3 Urban Retail Water Suppliers

SECTION 10608.16-10608.44

10608.16.(a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(b) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

10608.20.(a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the department's 2016 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by 2020.

(3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.

(4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31,

2020. In developing urban daily per capita water use targets, the department shall do all of the following:

(A) Consider climatic differences within the state.

(B) Consider population density differences within the state.

(C) Provide flexibility to communities and regions in meeting the targets.

(D) Consider different levels of per capita water use according to plant water needs in different regions.

(E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.

(F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.

(c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

(d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.

(e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.

(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

(h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:

(A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.

(B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.

(2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its Internet Web site, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

(i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with subdivision (l) of Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

(j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.

(2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph(3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

10608.24.(a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

(b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.

(c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.

(d) (1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:

(A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.

(B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.

(C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.

(2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.

(e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.

(f) (1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

(2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section

10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

10608.26.(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.

(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.

(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's implementation plan for complying with this part shall consider the conservation of that military installation under federal Executive Order 13514.

(d) (1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

(2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

10608.28.(a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

(1) Through an urban wholesale water supplier.

(2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31

(commencing with Section 81300)).

(3) Through a regional water management group as defined in Section 10537.

(4) By an integrated regional water management funding area.

(5) By hydrologic region.

(6) Through other appropriate geographic scales for which computation methods have been developed by the department.

(b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

10608.32. All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and
approval by the Public Utilities Commission, and may be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.40. Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

10608.42.(a) The department shall review the 2015 urban water management plans and report to the Legislature by July 1, 2017, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets to achieve the 20-percent reduction and to reflect updated efficiency information and technology changes.

(b) A report to be submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

10608.43 The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

(a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.

(b) Evaluation of water demands for manufacturing processes, goods, and cooling.

(c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.

(d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.

(e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

10608.44. Each state agency shall reduce water use at facilities it operates to support urban retail water suppliers in meeting the target identified in Section 10608.16.

Chapter 4 Agricultural Water Suppliers

SECTION 10608.48

10608.48.(a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).

(b) Agricultural water suppliers shall implement all of the following critical efficient management practices:

(1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).

(2) Adopt a pricing structure for water customers based at least in part on quantity delivered.

(c) Agricultural water suppliers shall implement additional efficient management practices, including, but not limited to, practices to accomplish all of the following, if the measures are locally cost effective and technically feasible:

(1) Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.

(2) Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.

(3) Facilitate the financing of capital improvements for on-farm irrigation systems.

(4) Implement an incentive pricing structure that promotes one or more of the following goals:

(A) More efficient water use at the farm level.

(B) Conjunctive use of groundwater.

(C) Appropriate increase of groundwater recharge.

(D) Reduction in problem drainage.

(E) Improved management of environmental resources.

(F) Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions.

(5) Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.

(6) Increase flexibility in water ordering by, and delivery to, water customers within operational limits.

(7) Construct and operate supplier spill and tailwater recovery systems.

(8) Increase planned conjunctive use of surface water and groundwater within the supplier service area.

(9) Automate canal control structures.

(10) Facilitate or promote customer pump testing and evaluation.

(11) Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.

(12) Provide for the availability of water management services to water users.

These services may include, but are not limited to, all of the following:

(A) On-farm irrigation and drainage system evaluations.

(B) Normal year and real-time irrigation scheduling and crop evapotranspiration information.

(C) Surface water, groundwater, and drainage water quantity and quality data.

(D) Agricultural water management educational programs and materials for farmers, staff, and the public.

(13) Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.

(14) Evaluate and improve the efficiencies of the supplier's pumps.

(d) Agricultural water suppliers shall include in the agricultural water management plans required pursuant to Part 2.8 (commencing with Section 10800) a report on which efficient water management practices have been implemented and are planned to be implemented, an estimate of the water use efficiency improvements that have occurred since the last report, and an estimate of the water use efficiency improvements estimated to occur five and 10 years in the future. If an agricultural water supplier determines that an efficient water management practice is not locally cost effective or technically feasible, the supplier shall submit information documenting that determination.

(e) The data shall be reported using a standardized form developed pursuant to Section 10608.52.

(f) An agricultural water supplier may meet the requirements of subdivisions (d) and (e) by submitting to the department a water conservation plan submitted to the United States Bureau of Reclamation that meets the requirements described in Section 10828.

(g) On or before December 31, 2013, December 31, 2016, and December 31, 2021, the department, in consultation with the board, shall submit to the Legislature a report on the agricultural efficient water management practices that have been implemented and are planned to be implemented and an assessment of the manner in which the implementation of those efficient water management practices has affected and will affect agricultural operations, including estimated water use efficiency improvements, if any.

(h) The department may update the efficient water management practices required pursuant to subdivision (c), in consultation with the Agricultural Water Management Council, the United States Bureau of Reclamation, and the board. All efficient water management practices for agricultural water use pursuant to this chapter shall be adopted or revised by the department only after the department conducts public hearings to allow participation of the diverse geographical areas and interests of the state.

(i) (1) The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).

(2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.

Chapter 5 Sustainable Water Management

Section 10608.50

10608.50.(a) The department, in consultation with the board, shall promote implementation of regional water resources management practices through increased incentives and removal of barriers consistent with state and federal law. Potential changes may include, but are not limited to, all of the following:

(1) Revisions to the requirements for urban and agricultural water management plans.

(2) Revisions to the requirements for integrated regional water management plans.

(3) Revisions to the eligibility for state water management grants and loans.

(4) Revisions to state or local permitting requirements that increase water supply opportunities, but do not weaken water quality protection under state and federal law.

(5) Increased funding for research, feasibility studies, and project construction.

(6) Expanding technical and educational support for local land use and water management agencies.

(b) No later than January 1, 2011, and updated as part of the California Water Plan, the department, in consultation with the board, and with public input, shall propose new statewide targets, or review and update existing statewide targets, for regional water resources management practices, including, but not limited to, recycled water, brackish groundwater desalination, and infiltration and direct use of urban stormwater runoff.

Chapter 6 Standardized Data Collection

SECTION 10608.52

10608.52.(a) The department, in consultation with the board, the California Bay-Delta Authority or its successor agency, the State Department of Public Health, and the Public Utilities Commission, shall develop a single standardized water use reporting form to meet the water use information needs of each agency, including the needs of urban water suppliers that elect to determine and report progress toward achieving targets on a regional basis as provided in subdivision (a) of Section 10608.28.

(b) At a minimum, the form shall be developed to accommodate information sufficient to assess an urban water supplier's compliance with conservation targets pursuant to Section 10608.24 and an agricultural water supplier's compliance with implementation of efficient water management practices pursuant to subdivision (a) of Section 10608.48. The form shall accommodate reporting by urban water suppliers on an individual or regional basis as provided in subdivision (a) of Section 10608.28.

Chapter 7 Funding Provisions

Section 10608.56-10608.60

10608.56.(a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(b) On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

(c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(d) Notwithstanding subdivision (b), the department shall determine that an agricultural water supplier is eligible for a water grant or loan even though the supplier is not implementing all of the efficient water management practices described in Section 10608.48, if the agricultural water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices. The supplier may request grant or loan funds to implement the efficient water management practices to the extent the request is consistent with the eligibility requirements applicable to the water funds.

(e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.

(f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).

10608.60.(a) It is the intent of the Legislature that funds made available by Section 75026 of the Public Resources Code should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for grants to implement this part. In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part.

(b) It is the intent of the Legislature that funds made available by Section 75041 of the Public Resources Code, should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for direct expenditures to implement this part.

Chapter 8 Quantifying Agricultural Water Use Efficiency

SECTION 10608.64

The department, in consultation with the Agricultural Water Management Council, academic experts, and other stakeholders, shall develop a methodology for quantifying the efficiency of agricultural water use. Alternatives to be assessed shall include, but not be limited to, determination of efficiency levels based on crop type or irrigation system distribution uniformity. On or before December 31, 2011, the department shall report to the Legislature on a proposed methodology and a plan for implementation. The plan shall include the estimated implementation costs and the types of data needed to support the methodology. Nothing in this section authorizes the department to implement a methodology established pursuant to this section.

Appendix D

Notification of Intent to Prepare the Urban Water Management Plan

OFFICE OF: PUBLIC WORKS DEPARTMENT

(951) 736-2266
(951) 279-3627 (FAX)

400 SOUTH VICENTIA AVENUE, P.O. BOX 940, CORONA, CALIFORNIA 92879-0940
CITY HALL - ON LINE ALL THE TIME (http://www.coronaca.gov)

June 1, 2021

Kecia Harper, Clerk of the Board
County of Riverside
4080 Lemon Street, 1st Floor
Riverside, CA 92501

Re: Notification to Prepare City of Corona 2020 Urban Water Management Plan

ATTN: Riverside County Administrator

Dear Ms. Harper:

The attached letter, dated February 12, 2021, was sent to the County of Riverside Executive Office regarding the preparation of the City of Corona 2020 Urban Water Management Plan. This letter was prepared and sent by our Consultant, Michael Baker, International. There is a typo present in the letter where Los Angeles County is mentioned instead of the County of Riverside. Please see correction in **bold** below:

*Pursuant to California Water Code Section 10621(b), I am notifying ~~Los Angeles County~~ t**he County of Riverside** as their representative that the City will be reviewing its UWMP and considering amendments or changes to it.*

Please contact me with any questions regarding this notification at Ulises.Escalona@CoronaCA.gov or (951) 279-3512.

Sincerely,

Ulises Escalona

Ulises Escalona
Associate Engineer

Attachment: County of Riverside Notification Letter_February 12, 2021

Michael Baker
INTERNATIONAL

February 12, 2021

County of Riverside Executive Office
4080 Lemon Street, 4th Floor
Riverside, CA 92501

RE: Notification to Prepare City of Corona 2020 Urban Water Management Plan

ATTN: Riverside County Administrator

Dear sirs:

Michael Baker International is preparing the City of Corona 2020 Urban Water Management Plan (UWMP).

Pursuant to California Water Code Section 10621(b), I am notifying Los Angeles County as their representative that the City will be reviewing its UWMP and considering amendments or changes to it.

> *Water Code Section 10621(b)*
>
> *Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.*

Please contact me with any questions regarding this notification at Anthony.Herda@mbakerintl.com or (626) 660-4837.

Warm regards,

Michael Baker International, Inc.

Anthony Herda

Anthony Herda, PE, MBA
UWMP Preparer

Appendix E

2020 Consumer Confidence Report

Consumer Confidence Report

2020
For the year 2019

CITY of CORONA
Department of Water and Power

"Protecting Public Health"

Message from the General Manager

Over the course of the past year the City of Corona Department of Water & Power (DWP) has remained committed to advancing the water system, ensuring the community is provided the highest quality drinking water. We are excited to share a few completed and upcoming projects:

- **The City Park Ion Exchange Treatment Plant (City Park IXTP)** consists of seven ion exchange treatment vessels designed to reduce nitrate and perchlorate levels from groundwater wells. Corona DWP took advantage of grants offered to construct this new Treatment Facility to aid in providing exceptional potable water.

- **The Keith Water Storage Tank** is currently under construction with an expected completion date of early 2021. This 2.5-million-gallon pre-stressed concrete tank will provide additional operational, emergency, and fire flow storage in the City's water distribution system.

- **The Mangular Blend Station** is an upcoming project that will allow the blending of surface and groundwater sources, and the ability to boost water into higher pressure zones, adding redundancy and reliability to the water distribution system.

This Consumer Confidence Report provides information with respect to the water produced and distributed in 2019. This summary provides water quality data, outlines where the water comes from, and how it compares to state standards. I am pleased to report that your tap water met all United States Environmental Protection Agency (USEPA) and State drinking water health standards. The Department of Water & Power's staff helped ensure that our system did not exceed any of the primary Maximum Contaminant Levels (MCLs).

Tom Moody
General Manager
951-736-2477
www.CoronaCA.gov/DWP

Corona's Water Sources

In 2019, Corona residents and businesses used approximately 9.7 billion gallons of drinking water. Corona's water supply comes from different sources: groundwater wells owned and operated by the City of Corona provided 48.7%, 47.7% came through Lake Mathews from the Colorado River, and 3.6% was from the State Water Project's California Aqueduct.

Water Treatment Processes

The surface water from the Colorado River requires treatment to become drinking water. The treatment process is accomplished in the City of Corona's two surface water treatment facilities: Sierra Del Oro and Lester. These facilities incorporate the use of coagulants, which bind small particles together to form larger particles that can be easily removed through multimedia filtration. After filtration, the water is treated with sodium hypochlorite to kill or inactivate harmful organisms. This part of the process is called disinfection.

Through independent laboratory testing, 100% of the samples taken in 2019 were free of harmful organisms.

Most of the groundwater pumped in Corona was sent through a state-of-the-art reverse osmosis membrane treatment facility, the Temescal Desalter. This facility provides removal of nitrates, per-fluorinated compounds, 1,2,3-Trichloropropane (1,2,3-TCP), perchlorates, and suspended and dissolved solids. Department of Water and Power (DWP) adds an ammonium hydroxide solution to the disinfected water which in conjunction with sodium hypochlorite forms a compound called chloramines. This chemical acts as a disinfectant in the distribution system and remains active for a longer period of time than sodium hypochlorite alone. It also helps reducing the formation of disinfection byproducts that could be harmful to our health. Disinfection byproducts are formed when some disinfectants like chlorine react with naturally occurring organic matter in the water.

Blending

DWP has five blending facilities that blend water with low nitrate, fluoride, perchlorate and Total Dissolved Solids (TDS) with the remaining groundwater sources to deliver safe, reliable drinking water to your tap. You will notice in the tables of detected contaminants that the groundwater exceeded the primary standard for fluoride, nitrate and perchlorate. DWP is required by law to report the range of all raw groundwater samples monitored, as well as the average concentration delivered to your tap. The averages of what you receive at your tap are much lower because DWP treats and blends water from several sources to improve water quality. The blending stations are continuously monitored and routinely sampled to ensure that the water delivered to your tap meets all health standards with a safety margin of no less than 10%. Please refer to the "Treated Average System Water" column in the tables at the end of the report for a more accurate representation of system water quality.

For more information about fluoridation, oral health, and current issues visit: **https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Fluoridation.html**.

Governor Brown's Executive Order B-40-17

Governor Edmund G. Brown Jr. ended the drought state of emergency in most of California on April 7, 2017, while maintaining water reporting requirements and prohibitions on wasteful practices, such as watering during or right after rainfall. The State released a long-term plan to better prepare the State for future droughts and make conservation a California way of life. Building on the successes and lessons learned from California's five-year drought, the plan establishes a framework for long-term efficient water use that reflects the State's diverse climate, landscape, and demographic conditions.


Sierra Del Oro Water Treatment Plant

DWP thanks everyone for their overwhelming participation in conservation over the past years. Thanks to everyone's efforts, Corona conserved nearly 7.1 billion gallons from June 2015 through March 2020, a reduction of 13.1% compared to water used during 2013. We ask that everyone be efficient in their water usage, by requiring all residents and businesses in DWP's service area to follow the water use guidelines below:

Water Use Guidelines

- No watering between 10 a.m. and 8 p.m.
- Odd numbered addresses can water on Saturday, Monday, and Wednesday only.
- Even numbered addresses can water on Sunday, Tuesday, and Thursday only.
- Watering on Fridays is prohibited. Since government institutions are not open on weekends, they may water three days per week of the agency's choosing.
- Limit sprinkler times to help conserve water.
- Leaks and broken sprinklers must be fixed in a timely manner.
- Drip irrigation, which waters in gallons per hour, can water for a maximum of 90 minutes per day, provided there is no runoff.
- Water cannot be allowed to run off property.
- All swimming pools, spas, ponds, and fountains shall be equipped with re-circulating pumps.
- Washing hard surfaces is prohibited.
- Vehicles can only be washed using a bucket and a hose with an automatic shut-off nozzle.
- In Corona, food establishments are prohibited from providing drinking water to patrons unless requested.

Rebates for Water Saving Appliances and Devices

Improve the water use efficiency at your home or business by upgrading your appliances and fixtures to water efficient models. DWP offers rebates for a variety of water saving appliances, devices, and fixtures. By upgrading your clothes washer to a high efficiency model you can save an average of 14 gallons of water per day, as well as save on energy. Using less water and energy with a high efficiency clothes washer (HECW) reduces your monthly bills and can save you over $400 over the lifetime of the HECW. On average, nearly 30% of water usage in the home goes toward flushing the toilet. Rebates are available for residents who replace toilets that use 1.6 gallons per flush (gpf) or more with new 1.06 gpf premium high efficiency toilets. The premium high efficiency toilets that qualify for the rebate have been certified through maximum performance (MaP) testing to ensure performance quality.

DWP offers a $50 rebate for newly-installed recirculating hot water systems. A recirculating hot water system uses a by-pass valve that connects the cold and hot water supply lines at the fixture that is farthest away from the water heater. The by-pass valve uses the cold water line as the return loop back to the water heater, continuously recirculating hot water. We also offer free water saving showerheads and faucet aerators for the bathroom and kitchen sinks. You can pick up your free devices at the Utility Billing counter at City Hall or contact the Water Resources Team at 951-736-2234 or e-mail **StopTheDrop@CoronaCA.gov**.

To help you improve water efficiency outdoors, DWP offers rebates on a variety of devices. Ensure your sprinklers are delivering a uniform and effective spray stream by upgrading your sprinkler nozzles to high efficiency multi-projectory nozzles and get a rebate! Once you have your irrigation system operating efficiently, it's time to upgrade your irrigation timer to a weather-based model that automatically adjusts the watering schedule based on the weather conditions. Never get caught watering during the rain again with a weather-based irrigation controller (WBIC).

To learn more about the rebates available, visit **www.CoronaCA.gov/Rebates**.

Water Efficiency Rebates for Businesses

DWP offers numerous rebates just for businesses to help them improve water efficiency and keep the water bill low. Available rebates for devices and fixtures include:

- Premium High Efficiency Toilets
- Ultra-Low and Zero Water Urinals
- Air Cooled Ice Machines
- Connectionless Food Steamers
- Conductivity and pH Controllers for Cooling Towers
- Weather-Based Irrigation Controllers (WBICs)
- Rotating Nozzles for Pop-Up Spray Heads

For more information on these and other water efficiency rebates available to Corona businesses, contact the Water Resources Team at (951) 736-2234 or e-mail **StopTheDrop@CoronaCA.gov**.

Water: An Undervalued Resource

Earth is called the blue planet because 71% of its surface is covered with water. Yet only 3% of the earth's water is fresh water that can be used for drinking, with two thirds stored in ice caps and glaciers. That's a small amount of water for everyone on the planet to share. Yet many of us don't think twice about the water that we use every day. All too often, water that has been pumped in from afar and treated for human consumption can be seen running down the storm drains – wasted.

At a cost of less than a penny per gallon, the true value of water is not represented in the price. Water is a precious resource; we all need water to live. The drought California experienced for over five years has proven that the water supply can be highly variable, with many factors that affect it, including drought, legislative restrictions, water quality issues, and environmental needs. We must always use our resources efficiently, and focus on sustainable water supplies. Make every drop count – use water efficiently always.

Reclaimed Water

To improve water supply reliability for the City, DWP developed and built our reclaimed water system in 2006. Utilizing reclaimed water to help meet water demands for the City reduces the impact of imported water supply shortages and costs. The reclaimed water system uses highly treated wastewater from our state-of-the-art water reclamation facilities and distributes it throughout the City. The reclaimed water system is separate from the drinking water system. Reclaimed water pipes, sprinkler caps, and signage are painted purple to easily identify them as part of the reclaimed water system. Reclaimed water is used primarily on landscaping at parks, schools, parkway areas, and a few commercial buildings. By re-using water we save potable water for our homes and businesses. A rebate incentive is offered for businesses that convert their landscape irrigation and/or process operation water use to reclaimed water. Save water and get funding assistance to cover the cost of the conversion. Contact the Water Resources Team at (951) 736-2234 or by e-mail at **StopTheDrop@CoronaCA.gov** to see if your business qualifies.

The City of Corona's reclaimed water system infrastructure consists of approximately 55 miles of pipeline, three storage tanks, and six pump stations.

Of the reclaimed water produced, 1.37 billion gallons went into the reclaimed water distribution system for customer use. We currently have 386 connections, and are continually adding new sites.


Lester Plant Testing Station

From Your Drain to the Environment – Keep It Clean

While water reclamation treatment removes most pollutants, even trace amounts of some substances may be harmful to the environment. The best solution is to prevent pollution from going down the drain in the first place.

Dispose of unwanted medicine properly… No Drugs Down the Drain!

For years, unwanted medicine was flushed down the drain to protect children and pets from accessing it, and to ensure against illegal recovery of controlled substances. Today, there are better options. Please visit the U.S. Food and Drug Administration website for more information on how to dispose of unused medicine: **https://www.fda.gov/forconsumers/consumerupdates/ucm101653.htm**.

Keep drains free of FOG – Fats, Oils and Grease

When washed down the drain, cooking fats, oils, and grease, aka "FOG," can block sewer lines, causing raw sewage to back up into your home or into neighborhood streets and storm drains. Overflows can be costly, and pose health and environmental hazards. Keep your sewer lines FOG-free by scraping cooking fats into the garbage or into your food scrap recycling bin, where available – not down the drain.

Sanitary wipes is another item that often causes blockages in the sewer lines. They should be kept away from drains and should not be flushed down the toilet.

General Water Quality Information

Drinking water sources (both tap and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

City Park Ion Exchange Treatment Plant

- Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides that may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- Organic chemical contaminants, including synthetic and volatile that are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, agricultural application, and septic systems.
- Radioactive contaminants that can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the USEPA and the State Water Resources Control Board (SWRCB) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk. These people should seek advice from their health care providers about drinking water. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the **Safe Drinking Water Hotline (1-800-426-4791)**.

Garretson Water Booster Station

Nitrate

Nitrate in drinking water at levels above 10 mg/L as nitrogen is a health risk especially for infants of less than six months of age because it can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 45 ppm may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider.

Source Water Assessment

In accordance with the Federal Safe Drinking Water Act (SDWA), the SWRCB Division of Drinking Water and Environmental Management developed a program, called the Drinking Water Source Assessment and Protection (DWSAP) Program, to assess the vulnerability of drinking water sources to contamination. Assessments of the drinking water sources for the City of Corona were completed in February 2012. The assessment concluded that the City of Corona's sources are considered most vulnerable to the following activities not associated with any detected contaminants in the water supply: automobile – gas stations, chemical/petroleum pipelines, chemical/ petroleum processing/storage, dry cleaners, historic gas stations, machine shops, metal plating/finishing/fabricating, mining sand/gravel, NPDES/WDR permitted discharges, plastics/synthetics producers, septic systems – low density [<1/acre], sewer collection systems, underground storage tanks – confirmed leaking tanks, utility stations – maintenance areas, and wastewater treatment plants. A copy of the complete assessments is available through the City of Corona's City Clerk's office at 400 S. Vicentia, Corona, CA 92882, or by using the online Public Records Request form at **https://www.CoronaCA.gov/services/public-records-request**.

Lead and Copper Rule Monitoring

The Lead and Copper Rule (LCR) was developed to protect public health by minimizing lead and copper levels in drinking water. The LCR established an action level of 15 parts per billion (ppb) for lead and 1.3 parts per million (ppm) for copper based on the 90th percentile level of tap water samples collected. Lead and copper are sampled on a mandated three year testing cycle with sampling conducted at the customer's tap.

Parameter	Units	State MCL	PHG	State DLR	Date Sampled	90th Percentile	No. Sites Sampled	No. Sites Exceeding AL
Lead	ppb	AL=15	0.2	5	2017	4	53	3
Copper	ppm	AL=1.3	0.3	0.05	2017	0.077	53	0

AL Allowable Levels
DLR Detection Limits for purposes of Reporting
MCL Maximum Contaminant Level
PHG Public Health Goal
ppb Parts per billion or micrograms per liter (µg/L)
ppm Parts per million or milligrams per liter (mg/L)

Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Corona is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential to lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at **http://www.epa.gov/lead**.

Primary Standards – Mandatory Health-Related Standards

CLARITY

Please see pages 19-21 for key to abbreviations and footnotes

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE		WATER SOURCE	MAJOR SOURCES IN DRINKING WATER
Combined Filter Effluent Turbidity	%	95(a)	NA	–	% < 0.3	100%	Metropolitan Water District Henry J. Mills Water Treatment Plant	Soil runoff
	NTU	TT 0.3			Highest	0.06		
Combined Filter Effluent Turbidity	%	95(a)	NA	–	% < 0.3	100%	City of Corona, Lester & Sierra Del Oro Water Treatment Facilities	Soil runoff
	NTU	TT 0.3			Highest	0.07		

MICROBIOLOGICAL CONTAMINANTS

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	REGULATED IN DISTRIBUTION SYSTEM	MAJOR SOURCES IN DRINKING WATER
Total Coliform Bacteria (State Total Coliform Rule)	%	5.0 (b)	(0)	–	–	Highest % of positive samples collected in any one month = 1%	Naturally present in the environment
Fecal Coliform and E. Coli (State Total Coliform Rule)	(c)	(c)	(0)	–	–	Total number of positive samples collected in 2019 = 0	Human and animal fecal waste
Total Coliform Bacteria (Federal Total Coliform Rule)	%	TT (d)	–	–	–	Highest % of positive samples collected in any one month = 1%	Naturally present in the environment
Fecal Coliform and E. Coli (Federal Total Coliform Rule)	(e)	(e)	(0)	–	–	Total number of positive samples collected in 2019 = 0	Human and animal fecal waste
Heterotrophic Plate Count (HPC)	CFU/mL	TT	NA	NA	Range	Distribution System Wide: ND-270	Naturally present in the environment
					Average	Distribution System Wide: 2	

RADIOACTIVE CONTAMINANTS (w)

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Gross Alpha Particle Activity (k)	pCi/L	15	(0)	3	Range	ND	ND - 3.2	ND - **18.25**	–	Erosion of natural deposits
					Average		ND	7.23	–	
Uranium	pCi/L	20	0.43	1	Range	ND	2.8 - 3.3	ND - 18.5	–	Erosion of natural deposits
					Average		3.1	8.32	–	

Primary Standards – (continued)

INORGANIC CONTAMINANTS

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Arsenic	µg/L	10	0.004	2	Range	ND	2.2	ND - 2.4	ND - 2.3	Erosion of natural deposits; runoff from orchards; glass and electronics production wastes
					Average			ND	ND	
Barium	mg/L	1	2	0.1	Range	ND	0.12	ND - 0.19	ND - 0.11	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
					Average			ND	ND	
Fluoride (h, t)	mg/L	2.0	1	0.1	Range	0.1 - 0.9	0.3	0.23 - 0.6	0.06 - 0.86	Erosion of natural deposits; water additive that promotes strong teeth; discharge from fertilizer and aluminum factories
					Average	0.7		0.34	0.26	
Nitrate (as Nitrogen) (k, t)	mg/L	10 (as N)	10 (as N)	0.4	Range	0.6	ND	1 - **22**	ND - 7.8	Runoff and leaching from fertilizer use; leaching from septic tanks and sewage; erosion of natural deposits
					Average			**12**	4.1	
Perchlorate (k, t)	µg/L	6	1	4	Range	ND	ND	ND - **10**	ND	Perchlorate is an inorganic chemical used in solid rocket propellant, fireworks, explosives, flares, matches, and a variety of industries. It usually gets into drinking water as a result of environmental contamination from historic aerospace or other industrial operations that used or use, store, or dispose of perchlorate and its salts
					Average			4.3		

SYNTHETIC ORGANIC CONTAMINANTS INCLUDING PESTICIDES/PCBs

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Dibromochloropropane (DBCP)	ng/L	200	1.7	10	Range	ND	ND	ND - 50	ND	Banned nematocide that may still be present in soils due to runoff/leaching from former use on soybeans, cotton, vineyards, tomatoes, and tree fruit
					Average			ND		
1,2,3-Trichloropropane (1,2,3-TCP)(k, t, u)	µg/L	0.005	0.0007	0.005	Range	ND	ND	ND - **0.027**	ND	Discharge from industrial and agricultural chemical factories; leaching from hazardous waste sites; used as cleaning and maintenance solvent, paint and varnish remover, and cleaning and degreasing agent; byproduct during the production of other compounds and pesticides
					Average			ND		

Primary Standards – (continued)

VOLATILE ORGANIC CONTAMINANTS

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Tetrachloroethylene (PCE)	µg/L	5	0.06	0.5	Range	ND	ND	ND - 0.51	ND	Discharge from factories, dry cleaners, and auto shops (metal degreaser)
					Average			ND		
Trichloroethylene (TCE)	µg/L	5	1.7	0.5	Range	ND	ND	ND - 1.5	ND	Discharge from metal degreasing sites and other factories
					Average			0.67		

Secondary Standards – Aesthetic Standards

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Aluminum (i)	µg/L	200	600	50	Range	ND - 94	ND	ND	ND - **260**	Erosion of natural deposits; residual from some surface water treatment processes
					Max RAA	ND			116	
Chloride	mg/L	500	NA	NA	Range	38 - 44	89 - 92	77 - 260	40 - 100	Runoff/leaching from natural deposits; seawater influence
					Average	41	90	166	80	
Corrosivity (as Aggressiveness Index)	AI	NA	NA	NA	Range	11.9 - 12	–	12 - 13	11 - 12	Elemental balance in water; affected by temperature, other factors
					Average	12	–	13	12	
Manganese (f, k)	µg/L	50	NL=500	20	Range	ND	ND	ND - **100**	ND	Leaching from natural deposits
					Average			ND		
Odor Threshold	Units	3	NA	NA	Range	ND	**6**	ND - **4**	ND - 2	Naturally-occurring organic materials
					Average			0.73	1.3	
Specific Conductance (k)	µS/cm	1600	NA	NA	Range	299 - 343	934 - 961	1,100 - **2,100**	176 - 1,080	Substances that form ions when in water; seawater influence
					Average	321	948	1,453	666	
Sulfate	mg/L	500	NA	0.5	Range	24 - 39	220	120 - 380	4 - 250	Runoff/leaching from natural deposits; industrial wastes
					Average	32		211	109	

Secondary Standards – Aesthetic Standards – (continued)

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	MAJOR SOURCES IN DRINKING WATER
Total Dissolved Solids (j, k, t)	mg/L	1000	NA	NA	Range	163 - 196	596 - 600	630 - **1,300**	130 - 740	Runoff/leaching from natural deposits
					Average	180	598	888	384	
Turbidity	NTU	5	NA	NA	Range	ND	0.7 - 0.8	ND - 0.57	ND	Soil runoff
					Average		0.8	0.02		

Unregulated Contaminants with No MCLs (g)

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER	HEALTH EFFECTS
Boron (p)	mg/L	NA	NL=1	0.1	Range	0.12	0.12	0.41 - 0.44	0.12 - 0.3	The babies of some pregnant women who drink water containing boron in excess of the notification level may have an increased risk of developmental effects, based on studies in laboratory animals
					Average			0.43	0.22	
Hexavalent Chromium (v)	µg/L	NA	0.02	1	Range	ND	ND	ND - 3.5	ND	Discharge from electroplating factories, leather tanneries, wood preservation, chemical synthesis, refractory production, and textile manufacturing facilities; erosion of natural deposits
					Average			ND		
Perfluorooctanoic acid (PFOA)	ng/L	NA	NL=5.1	NA	Range	ND	ND	ND - 230	ND - 9.6	Perfluorooctanoic acid exposures resulted in increased liver weight in laboratory animals
					Average			45	2.7	
Perfluorooctanesulfonate acid (PFOS)	ng/L	NA	NL=6.5	NA	Range	ND	ND	ND - 210	ND - 9.9	Perfluorooctanesulfonic acid exposures resulted in immune suppression, specifically, a decrease in antibody response to an exogenous antigen challenge
					Average			48	3.0	
Vanadium	µg/L	NA	NL=50	3	Range	ND	ND	ND - 8.1	ND - 3.2	The babies of some pregnant women who drink water containing vanadium in excess of the notification level may have an increased risk of developmental effects, based on studies in laboratory animals
					Average			4.6	0.13	

Federal Unregulated Contaminants Monitoring Rule (UCMR 3) (s)

LIST 1 – ASSESSMENT MONITORING

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	DISTRIBUTION SYSTEM
1,4-Dioxane	µg/L	NA	NA	0.07	Range	ND-0.14
					Average	ND
Chlorate	µg/L	NA	NA	20	Range	75-360
					Average	155
Chromium	µg/L	NA	NA	0.2	Range	ND-0.52
					Average	ND
Hexavalent Chromium (Dissolved)	µg/L	NA	NA	0.03	Range	ND-0.43
					Average	0.134
Molybdenum	µg/L	NA	NA	1	Range	ND-17
					Average	3.6
Strontium	µg/L	NA	NA	0.3	Range	25-1,100
					Average	591
Vanadium	µg/L	NA	NA	0.2	Range	ND-6.4
					Average	2.4
Perfluoro octanesulfonic acid - PFOS	µg/L	NA	NA	0.04	Range	ND-0.046
					Average	ND
Perfluorooctanoic acid - PFOA	µg/L	NA	NA	0.02	Range	ND-0.042
					Average	ND
Perfluoroheptanoic acid - PFHpA	µg/L	NA	NA	0.01	Range	ND-0.013
					Average	ND

Federal Unregulated Contaminants Monitoring Rule (UCMR 4) (x)

HALOACTIC ACID (HAA) GROUP

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	DISTRIBUTION SYSTEM
HAA5 (o)	µg/L	NA	NA	NA	Range	ND-15.8
					Average	5.9
HAA6Br (y)	µg/L	NA	NA	NA	Range	ND-17.3
					Average	6.1
HAA9 (z)	µg/L	NA	NA	NA	Range	ND-28
					Average	10.2
Total Organic Carbon	µg/L	NA	NA	NA	Range	ND-2600
					Average	1925
Bromide	µg/L	NA	NA	NA	Range	ND-32
					Average	15.3

METALS AND METALLOIDS GROUP

Manganese	µg/L	NA	NA	NA	Range	ND-62
					Average	2

Water-saving Tip: *If your dishwasher is new, cut back on rinsing. Newer models clean more thoroughly than older ones.*

Other Parameters

CHEMICAL	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE	STATE PROJECT WATER	COLORADO RIVER WATER	GROUND WATER	TREATED AVERAGE SYSTEM WATER
Alkalinity	mg/L	NA	NA	NA	Range	54 - 59	110 - 128	130 - 370	31 - 140
					Average	56	119	244	77
Bicarbonate	mg/L	NA	NA	NA	Range	–	–	190 - 450	37 - 170
					Average	–	–	297	94
Calcium	mg/L	NA	NA	NA	Range	14 - 16	63 - 68	57 - 200	6.7 - 110
					Average	15	66	129	42
Carbonate	**mg/L**	NA	NA	NA	Range	–	–	ND - 3	ND
					Average	–	–	0.3	
Hardness (q)	mg/L	NA	NA	NA	Range	66 - 76	257 - 277	300 - 700	23 - 450
					Average	71	267	471	169
Magnesium	mg/L	NA	NA	NA	Range	8.0 - 8.5	26	15 - 74	1.5 - 42
					Average	8.2		36	15
pH	pH Units	NA	NA	NA	Range	8.6	8.0 - 8.2	6.4 - 7.8	7.3 - 8.9
					Average		8.2	7.0	8.0
Potassium	mg/L	NA	NA	NA	Range	1.8 - 2.2	4.6 - 4.7	1.9 - 10	1.4 - 5
					Average	2.0	4.6	4	3.5
Sodium (r)	mg/L	NA	NA	NA	Range	33 - 40	92 - 96	51 - 190	36 - 91
					Average	36	94	124	68

Water-saving Tip: *Turning off the water while washing your hair can save up to 150 gallons a month.*

Disinfection Byproducts, Disinfectant Residuals, and Disinfection Byproduct Precursors Federal Rule (m)

PARAMETER	UNITS	STATE MCL [MRDL]	PHG (MCLG) [MRDLG]	STATE DLR	RANGE AVERAGE/ LRAA/RAA	DISTRIBUTION SYSTEM WIDE	MAJOR SOURCES IN DRINKING WATER	HEALTH EFFECTS LANGUAGE
Total Trihalomethanes (TTHMs) (n)	µg/L	80	NA	1	Range	ND - 41	Byproduct of drinking water disinfection	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience liver, kidney, or central nervous system problems, and may have an increased risk of getting cancer.
					LRAA	30.0		
Haloacetic Acids (HAA5) (o)	µg/L	60	NA	1	Range	ND - 11	Byproduct of drinking water disinfection	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
					LRAA	15.5		
Bromate (Mills - WR-24 Conn.) (l)	µg/L	10	0.1	1	Range	ND - 7.3	Byproduct of drinking water disinfection	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
					Max RAA	3.6		
Chloramines	mg/L	[4 as Cl2]	[4 as Cl2]	NA	Range	0.66 - 3.28	Drinking water disinfectant added for treatment	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
					Max RAA	1.89		
Control of DBP precursors (TOC)	mg/L	TT	NA	0.3	Range	1.8-3.1	Various natural and manmade sources	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of cancer.
					Average	2.4		

Reminder: *Even wipes labeled “flushable” will clog pipes and interfere with sewage collection and treatment. Please discard in trash, NOT the toilet.*

Key to Abbreviations

CFU/mL	Colony-Forming Units per Milliliter
DBP	Disinfection Byproducts
DLR	Detection Limits for purposes of Reporting
LRAA	Locational Running Annual Average
MBAS	Methylene Blue Active Substances
N	Nitrogen
NA	Not Applicable
ND	Not Detected
NL	Notification Level
NTU	Nephelometric Turbidity Units
pCi/L	PicoCuries per liter
µg/L	Micrograms per liter or parts per billion (ppb)
mg/L	Milligrams per liter or parts per million (ppm)
ng/L	Nanograms per liter or parts per trillion (ng/L)
RAA	Running Annual Average
TOC	Total Organic Carbon
µS/cm	microSiemen per centimeter; or micromho per centimeter (µmho/cm)

Extended Abbreviations

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible. Secondary MCLs are set to protect the odor, taste and appearance of drinking water.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the U.S. Environmental Protection Agency.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

Primary Drinking Water Standard (PDWS): MCLs and MRDLs for contaminants that affect health along with their monitoring and reporting requirements, and water treatment requirements.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Regulatory Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements that a water system must follow.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Water-saving Tip: *When washing your hands, turn the water off while you lather.*

Footnotes

(a) The turbidity level of the filtered water shall be less than or equal to 0.3 NTU in 95% of the measurements taken each month and shall not exceed 1 NTU at any time. Turbidity, a measure of the cloudiness of the water, is an indicator of treatment performance. The averages and ranges of turbidity shown in the Secondary Standards were based on the treatment plant effluent.

(b) Total coliform MCLs: No more than 5.0% of the monthly samples may be total coliform-positive. Compliance is based on the combined distribution system sampling from all the treatment plants. In 2019, 1596 samples were analyzed and two were positive for total coliform. The MCL was not violated.

(c) *E. coli* MCL: The occurrence of two consecutive total coliform-positive samples, one of which contains E. coli, constitutes an acute MCL violation. The MCL was not violated.

(d) Total coliform TT trigger, Level 1 assessments, and total coliform TT violations: More than 5.0% total coliform-positive samples in a month trigger Level 1 assessments. Failure to conduct assessments and correct findings within 30 days is a total coliform violation. No triggers, Level 1 assessments, or violations occurred.

Lester Plant Chemical Tank Farm

(e) *E. coli* MCL and Level 2 TT triggers for assessments: Routine and repeat samples are total coliform-positive and either sample is E. coli-positive or system fails to collect all repeat samples following an E. coli-positive sample, or fails to test for E. coli when the repeat sample is total coliform-positive. No samples were E. coli-positive. No MCLs violations or no assessments occurred.

(f) The high concentration of Manganese is from one groundwater well; refer to the "Treated Average System Water" column for a more accurate representation of system water quality.

(g) Unregulated contaminant monitoring helps the USEPA and the State Board determine where certain contaminants occur and whether the contaminants need to be regulated.

(h) City of Corona was in compliance with all provisions of the State's Fluoridation System Requirements. This is part of the City of Corona's blending plan to reduce the levels of fluoride being delivered to the consumer's tap. Refer to the "Treated Average System Water" column for a more accurate representation of system water quality.

(i) Aluminum has a secondary standard limit. In 2019, the secondary standard limit was exceeded but the maximum running annual average (Max RAA) was in compliance. Our current Max RAA for 2020 is 84 ug/L.

(j) Total Dissolved Solids (TDS) is a measure of the total amount of all the materials that are dissolved in water. These minerals, both natural and anthropogenic (made by humans), are mainly inorganic solids, with a minor amount of organic material.

(k) This constituent was detected at levels exceeding the MCL, results shown in bold. Please note that this water is blended with water from other sources to provide customers with the highest quality drinking water.

(l) Reported from Mills Filtration Plant Metropolitan Water District (MWD). Mills MWD water is blended with other Corona water sources. Please note that this water is blended with water from other sources to provide customers with the highest quality drinking water.

(m) The City of Corona was in compliance with all provisions of the Stage 2 Disinfectants and Disinfection Byproducts Rules (D/DBP). Compliance was based on the locational running annual average (LRAA). The average reported reflects the highest TTHM and HAA5 LRAAs for the year.

(n) Total Trihalomethanes is the sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane.

(o) HAA5 is the sum of dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, dibromoacetic acid, and monochloroacetic acid.

(p) The sources that were detected for Boron are all directed to the Temescal Desalter for reverse osmosis treatment. The treated water is monitored at the effluent of the facility which is represented in the "Treated Average System Water" column.

(q) Hardness is the sum of polyvalent cations present in the water, generally magnesium and calcium. The cations are usually naturally occurring.

(r) Sodium refers to the salt present in the water and is generally naturally occurring.

(s) Data was collected in 2014 and reported per UCMR 3 guidance. Minimum reporting levels are as stipulated in the Federal UCMR 3. List 1 - Assessment Monitoring consists of 21 chemical contaminants for which standard analytical methods were available. All analyses conducted by contract laboratories. Values listed in state DLR column are federal minimum reporting levels.

(t) Fluoride, nitrate, perchlorate, TDS, and 1,2,3-TCP are a part of Corona's blending remediation plan to reduce the levels being delivered to the consumer's tap. Refer to the "Treated Average System Water" column for a more accurate representation of system water quality.

(u) 1,2,3-Trichloropropane (1,2,3-TCP) had a notification level (NL) of 0.005 ug/L until December 14, 2017, when the MCL of 0.005 ug/L became effective. 1,2,3-TCP was monitored quarterly in Corona's source and treated waters for the State's initial monitoring requirement and continues to be monitored per our Blending Plan requirements.

(v) There is currently no MCL for hexavalent chromium. The previous MCL of 0.010 mg/L (10 ug/L) was withdrawn on September 11, 2017. However, any hexavalent chromium results above the detection limit of 0.0001 mg/L (1 ug/L) have been reported.

(w) Results included in this section range from 2011-2019.

(x) UCMR 4 sampling began in 2018. Minimum reporting levels are as stipulated in the Federal UCMR 4. Monitoring under UCMR 4 continued through 2019 and detected results are included in the CCR.

(y) HAA6Br: Bromochloroacetic acid, bromodichloroacetic acid, dibromoacetic acid, dibromochloroacetic acid, monobromoacetic acid, and tribromoacetic acid.

(z) HAA9: Bromochloroacetic acid, bromodichloroacetic acid, chlorodibromoacetic acid, dibromoacetic acid, dichloroacetic acid, monobromoacetic acid, monochloroacetic acid, tribromoacetic acid, and trichloroacetic acid.

Frequently Asked Questions

How hard is my water?

Hardness is dissolved minerals, including calcium and magnesium. This may cause a deposit or water spots on fixtures and dishes. Our average hardness in the system is 169 ppm or 9.9 grains per gallon, which is classified as hard. Our water hardness can change depending on the water demand and the season.

When I turn on my kitchen or bathroom faucet, the water comes out white. What is wrong?

Dissolved air in the water causes a milky appearance. When you open your faucet, the pressure is relieved and this allows the air to form bubbles that rise to the top of the glass. It will clear within a minute, beginning at the bottom of the glass. The water is safe to drink.

How do I flush my water heater?

We have general instructions for flushing your water heater; for specific instructions consult your user's manual or look on the manufacturer's website. Below are general instructions; for more information, please call 951-736-2234.

1. Turn the gas valve to "pilot."
2. Hook up a garden hose to the water heater and find a proper location to drain the water; use caution – water will be hot when it comes out.
3. Open the valve until all of the hot water has drained from the water heater.
4. Close the valve where the garden hose is hooked up.
5. Allow the heater to fill up, and then close the cold water supply on top of the water heater.
6. Open up the hose bib again and let it drain.
7. Repeat the cycle a couple of times.
8. Disconnect the garden hose, turn the water supply back on and turn the gas valve to the "on" position.

My water pressure has been very high recently, what's wrong?
The City has six separate water pressure zones. Your pressure should be constant throughout the day, but may decrease when system demands go up, such as during the night when a lot of water is used for irrigation. If your pressure has suddenly increased, it may mean that your pressure regulator needs to be adjusted or replaced. Call us at 951-736-2234 and we will be happy to help troubleshoot the issue for you.

There is odor coming from my water, what's wrong? Is the water safe to drink?
We sometimes receive phone calls from customers stating that their water smells. However, the source of the odor is usually not the water, but from something else in the home. To test this, simply fill a glass with water and smell it. If the water itself does not smell, but you still smell the odor, there could be another issue such as a sink that needs to have the garbage disposal cleaned or run. A front loading washing machine can also develop an odor from mold if the lid remains closed.

Did you know?

- There are 748 gallons of water in one unit of water.
- One acre-foot of water equals 325,829 gallons or 435.6 billing units.
- One acre-foot of water can supply two typical families with water for a whole year.
- A leaky toilet can waste between 30 to 500 gallons of water per day.

To change the language of this report, please select the language under "Translate" in the upper menu features found at **https://www.coronaca.gov/government/departments-divisions/department-of-water-and-power/about-dwp/consumer-confidence-report**.

Español: Para cambiar el idioma de este reporte, seleccione el idioma en "Translate" en las funciones del menú que se encuentra en: **https://www.coronaca.gov/government/departments-divisions/department-of-water-and-power/about-dwp/consumer-confidence-report**.

If you are interested in participating in decisions that affect the quality and supply of the water in the City of Corona, or for general information about this report and questions related to water quality, please call 951-736-2234.

Regular City Council meetings are held on the first and third Wednesday of every month.

Environmental Sustainability & Recycling

The Corona Recycles program goal is to increase recycling, promote reuse and improve overall environmental sustainability that is in line with the State of California's Assembly Bills (AB) 341 and 1826 requirements. The State's goal is to reduce the amount of overall waste sent to landfills in order to reduce greenhouse gas emissions by diverting recyclable and organic recyclable material from landfills to recycling and organic processing facilities. The State's approach has been phased in over several years triggering specific requirements for businesses and multi-family residential dwellings with five units or more by requiring them to arrange for recycling and organic recycling services through their approved hauler, or implement an in-house recycling program.

The Corona Recycles Team provides assistance by conducting site assessments to determine customer needs, share information on how to implement in-house recycling programs, and assist with coordination of services with our hauler, Waste Management. The Corona Recycles Team also provides businesses with start-up Business Kits that include training posters and signage for breakrooms or kitchenettes that describe the Do's and Don'ts for recycling and organics recycling.

To request a complimentary in-person site assessment or a Business Kit, contact the Corona Recycles Team at 951-736-2234 or e-mail CoronaRecycles@CoronaCA.gov.

AB 341 and 1826 are the beginning steps towards increased waste reduction and overall greenhouse gas emissions, specifically methane. California's future Senate Bill (SB) 1383's goal will be to expand the organic waste recycling requirements with a goal to achieve a 75% reduction of organic waste sent to landfills by 2025 based on the levels that were reported in 2014.

The Corona Recycles Team plans to be there every step of the way to ensure a smooth transition to a more sustainable, environmentally-friendly Corona.

City of Corona
Department of Water and Power
P.O Box 950
Corona, CA 92878

Appendix F

DWR Bulletin 118

Upper Santa Ana Valley Groundwater Basin, Temescal Subbasin

- Groundwater Basin Number: 8-2.09
- County: Riverside
- Surface Area: 23,500 acres (37 square miles)

Basin Boundaries and Hydrology

The Temescal Subbasin underlies the southwest part of upper Santa Ana Valley. On the north, the subbasin is bounded by the Chino Subbasin, marked by the Santa Ana River and a set of low hills of crystalline rock near Norco. The eastern part of the subbasin is bounded by nonwater-bearing crystalline rocks of the El Sobrante de San Jacinto and La Sierra Hills. The subbasin is bounded on the west by the Santa Ana Mountains and the south by the Elsinore Groundwater Basin at a constriction in the alluvium of Temescal Wash. Average annual precipitation ranges from 14 to 16 inches per year.

Hydrogeologic Information

Water Bearing Formations

The water-bearing materials are dominantly composed of Holocene age alluvium deposited by streams draining the northeast slopes of the Santa Ana Mountains. The Santa Ana River has from time to time contributed deposits through the Arlington Gap along the northern margin of the subbasin (DWR 1934).

The specific yield varies from about 6 percent along the southwestern and southern margins of the subbasin to about 13 percent beneath the Santa Ana River and more than 14 percent beneath Temescal Wash near Corona (DWR 1934).

Restrictive Structures

The Elsinore fault zone lies along the western boundary of the subbasin, and the Chino fault zone crosses the northwestern tip of the subbasin. These fault zones are possible groundwater barriers (SBVWCD 2000).

Recharge Areas

Dominant recharge to the groundwater reservoir is from percolation of precipitation on the valley floor and infiltration of stream flow within tributaries exiting the surrounding mountains and hills.

Groundwater Level Trends

Groundwater flows toward the center of the subbasin and then northeast toward the Santa Ana River (SBVWCD 2000).

Groundwater Storage

Groundwater Storage Capacity. Unknown.

Groundwater in Storage. Unknown.

Groundwater Budget (Type C)

No information is available.

Groundwater Quality

Characterization. Water within the subbasin is predominantly calcium-sodium bicarbonate and has an average TDS content of 790 mg/L (SBVWCD 2000). Water from 20 public supply wells in the subbasin has an average TDS content of 753 mg/L and a range or 373 to 950 mg/L.

Impairments.

Water Quality in Public Supply Wells

Constituent Group[1]	Number of wells sampled[2]	Number of wells with a concentration above an MCL[3]
Inorganics – Primary	20	2
Radiological	17	1
Nitrates	20	13
Pesticides	17	0
VOCs and SVOCs	17	0
Inorganics – Secondary	20	2

[1] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in *California's Groundwater – Bulletin 118* by DWR (2003).
[2] Represents distinct number of wells sampled as required under DHS Title 22 program from 1994 through 2000.
[3] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Well Characteristics

	Well yields (gal/min)	
Municipal/Irrigation	Range:	Average:
	Total depths (ft)	
Domestic	Range:	Average:
Municipal/Irrigation	Range:	Average:

Active Monitoring Data

Agency	Parameter	Number of wells /measurement frequency
USGS	Groundwater levels	2
USGS	Miscellaneous water quality	2
Department of Health Services and cooperators	Title 22 water quality	20

Basin Management

Groundwater management:	The City of Corona is developing a groundwater management plan for the Temescal Basin.
Water agencies	
Public	
Private	

References Cited

California Department of Water Resources (DWR). 1934. South Coastal Basin Investigation.

San Bernardino Valley Water Conservation District (SBVWCD). 2000. *Engineering Investigation of the Bunker Hill Basin 1999-2000.*

Additional References

Wildermuth Environmental, Inc. (Wildermuth). 2000. *TIN/TDS Study - Phase 2A of the Santa Ana Watershed; Final Technical Memorandum*. San Clemente, California, July 2000.

Errata

Updated groundwater management information and added hotlinks to applicable websites. (1/20/06)

8-004.02 ELSINORE - BEDFORD-COLDWATER

Basin Boundaries

Summary

The Bedford-Coldwater groundwater subbasin is located in western Riverside County. The basin is separated from the Temescal subbasin to the northwest by a groundwater divide near Bedford Wash. The Bedford-Coldwater subbasin is bound on the east and west by consolidated rocks of Estelle Mountain and the Santa Ana Mountains, respectively. The southern boundary adjoins the Elsinore Valley subbasin and follows a jurisdictional boundary separating the two subbasins. The boundary is defined by 19 segments detailed in the descriptions below.

Segment Descriptions

Segment Label	Segment Type	Description	Ref
1-2	E Alluvial	Begins from point (1) and follows the contact of Quaternary alluvium with Cretaceous metamorphic rocks of the Santa Ana Mountains to point (2).	{a}
2-3	I Groundwater Divide	Continues from point (2) and follows a groundwater divide to point (3).	{b}
3-4	E Alluvial	Continues from point (3) and generally follows the contact of Quaternary alluvium with early Pleistocene alluvial fan deposits, Paleocene Silverado Formation, Cretaceous volcanic rocks, various Cretaceous plutonic rocks, and Triassic metasedimentary and metavolcanic rocks to point (4).	{c}
4-5	I Management Area	Continues from point (4) and follows the jurisdictional boundary separating the Temescal Valley Water District from the Elsinore Valley Municipal Water District to point (5).	{d}
5-6	E Alluvial	Continues from point (5) and follows the contact of Quaternary alluvium with Cretaceous Estelle Mountain volcanics to point (6).	{c}
6-7	I Management Area	Continues from point (6) and follows the jurisdictional boundary separating the Temescal Valley Water District from the Elsinore Valley Municipal Water District to point (7).	{d}
7-1	E Alluvial	Continues from point (7) and follows the contact of Quaternary alluvium with Jurassic Bedford Canyon Formation and various Cretaceous plutonic rocks of the Santa Ana Mountains and ends at point (1).	{c}
8-8	E Alluvial	Island within the basin boundary: begins from point (8) and follows the contact of Quaternary alluvium or artificial fill with Paleocene Silverado Formation, Cretaceous plutonic rocks, and Triassic metasedimentary and metavolcanic rocks to point (8).	{c}
9-9	E Alluvial	Island within the basin boundary: begins from point (9) and follows the contact of Quaternary alluvium with Tertiary Topanga group of marine sediments and Tertiary Vaqueros, Sespe, and Silverado Formations to point (9).	{c}
10-10	E Alluvial	Island within the basin boundary: begins from point (10) and follows the	{c}

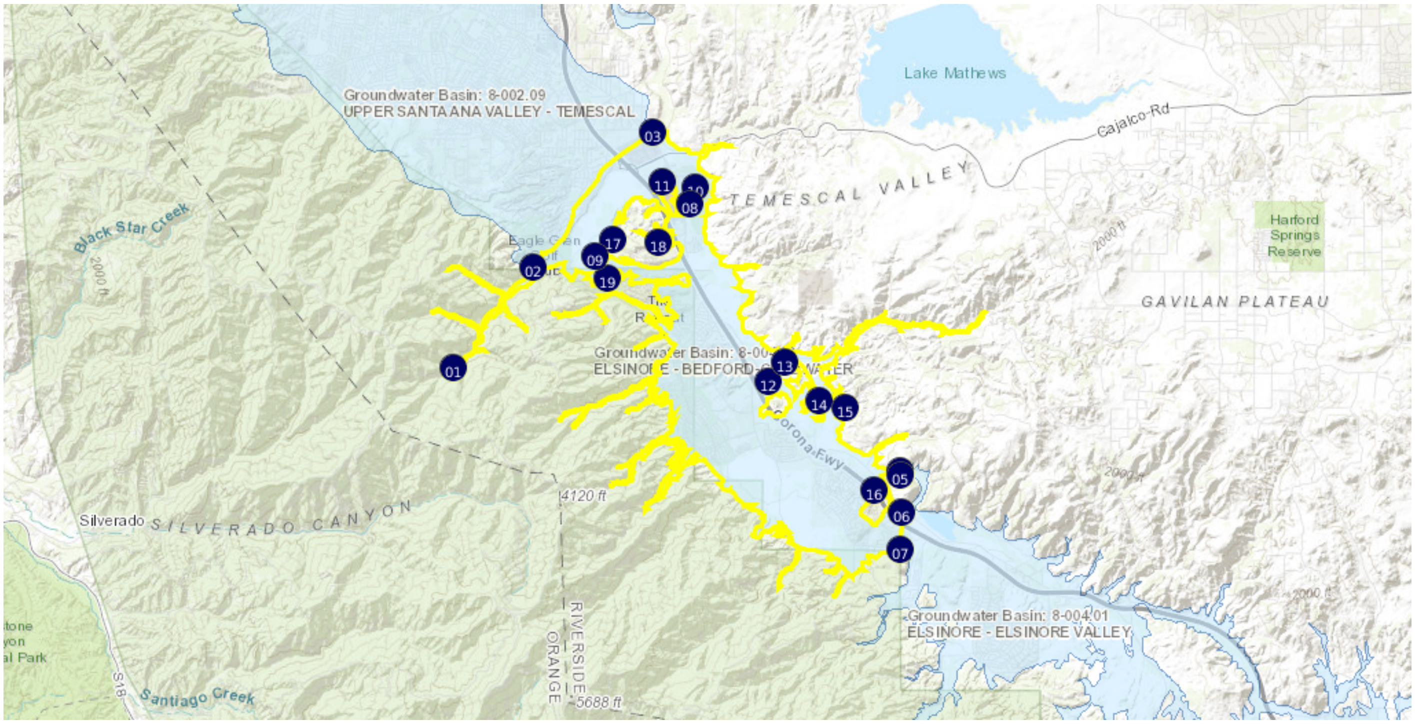
		contact of Pleistocene alluvium with Paleocene Silverado Formation to point (10).	
11-11	E Alluvial	Island within the basin boundary: begins from point (11) and follows the contact of Quaternary alluvium or artificial fill with Paleocene Silverado Formation to point (11).	{c}
12-12	E Alluvial	Island within the basin boundary: begins from point (12) and follows the contact of Quaternary alluvium with Paleocene Silverado Formation to point (12).	{c}
13-13	E Alluvial	Island within the basin boundary: begins from point (13) and follows the contact of Quaternary alluvium with Paleocene Silverado Formation and Triassic metasedimentary and metavolcanic rocks to point (13).	{a}
14-14	E Alluvial	Island within the basin boundary: begins from point (14) and follows the contact of Quaternary alluvium with Cretaceous Estelle Mountain volcanic rocks and Triassic metasedimentary and metavolcanic rocks to point (14).	{c}
15-15	E Alluvial	Island within the basin boundary: begins from point (15) and follows the contact of Quaternary alluvium with Cretaceous Estelle Mountain volcanic rocks and Triassic metasedimentary and metavolcanic rocks to point (15).	{c}
16-16	E Alluvial	Island within the basin boundary: begins from point (16) and follows the contact of Quaternary alluvium with Tertiary Topanga group of marine sediments and Tertiary Vaqueros and Sespe Formations to point (16).	{c}
17-17	E Alluvial	Island within the basin boundary: begins from point (17) and follows the contact of Quaternary alluvium with Paleocene Silverado Formation to point (17).	{c}
18-18	E Alluvial	Island within the basin boundary: begins from point (18) and follows the contact of Quaternary alluvium with Paleocene Silverado Formation to point (18).	{c}
19-19	E Alluvial	Island within the basin boundary: begins from point (19) and follows the contact of Quaternary alluvium or landslide deposits with Tertiary Vaqueros and Sespe Formations to point (19).	{c}

Significant Coordinates

Point	**Latitude**	**Longitude**	
1	33.779617348	-117.56234861	
2	33.800555285	-117.542432974	
3	33.828576167	-117.512654588	
4	33.758400757	-117.450700384	
5	33.757619077	-117.450701841	
6	33.749834798	-117.450456486	
7	33.742171922	-117.45081152	
8	33.813657348	-117.503401425	
9	33.80298986	-117.527206161	
10	33.817083315	-117.502061053	
11	33.818382037	-117.510322081	
12	33.776853859	-117.483852061	
13	33.780899405	-117.479699934	
14	33.773035679	-117.471238502	
15	33.771565887	-117.464605454	
16	33.754488258	-117.457271385	
17	33.806376258	-117.522498483	
18	33.805755342	-117.511387199	
19	33.798413174	-117.523900357	

Map

8-004.02 ELSINORE - BEDFORD-COLDWATER



https://sgma.water.ca.gov/webgis/?appid=160718113212&subbasinid=8-004.02

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Ref	Citation	Pub Date	Global ID
{a}	United States Geological Survey (USGS), Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California, 1:100,000, D.M. Morton and F.K. Miller.URL: http://pubs.usgs.gov/of/2006/1217/	2006	69
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{d}	California Department of Water Resources (DWR), Water Agencies Dataset.URL: https://gis.water.ca.gov/app/bbat/	2016	48

Footnotes

- I: Internal
- E: External

Appendix G

Corona 2008 Groundwater Management Plan

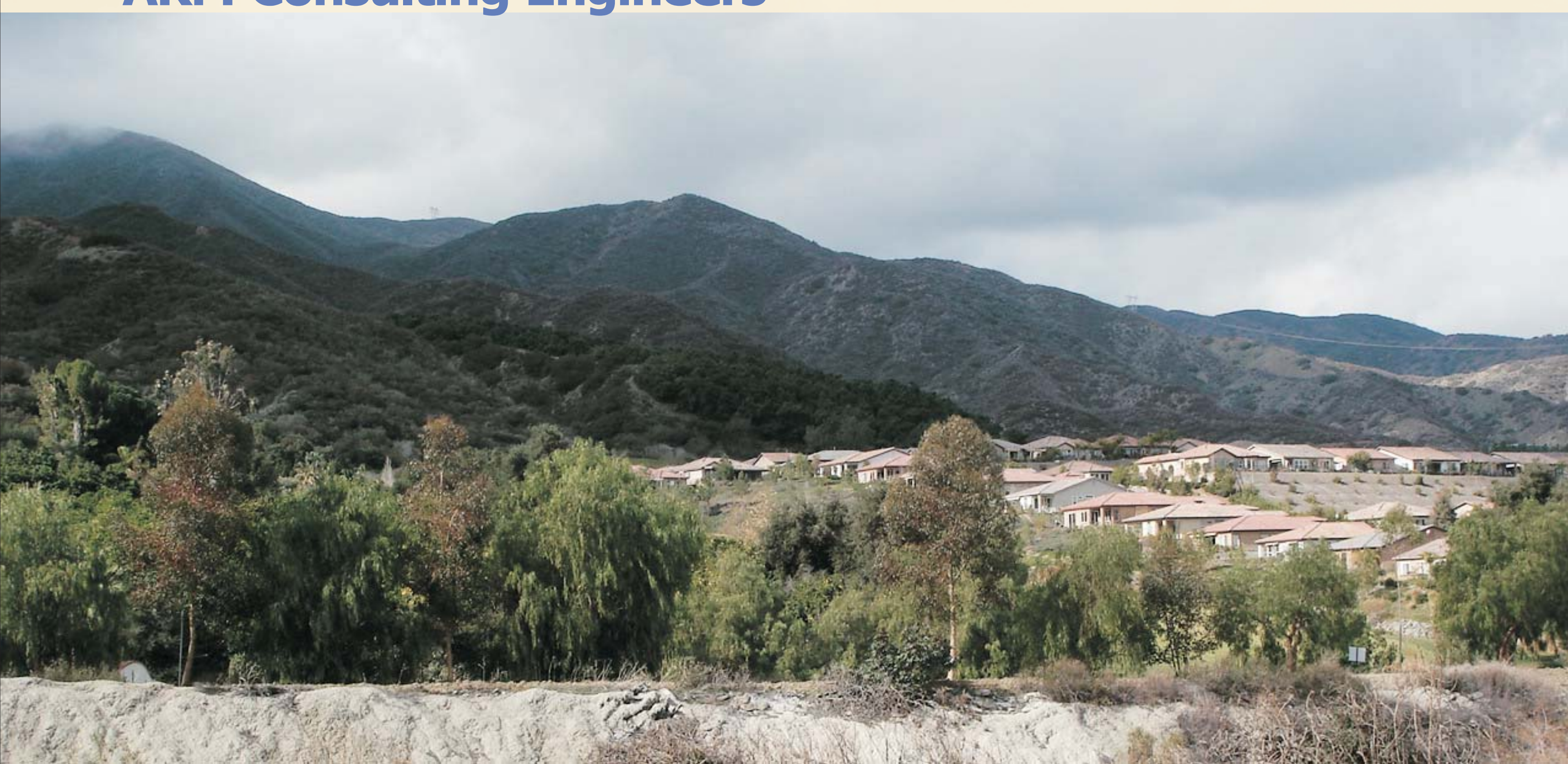
AB3030

Groundwater Management Plan

Prepared for
City of Corona

June 2008

Todd Engineers
AKM Consulting Engineers



Final

AB3030 Groundwater Management Plan

Prepared for:

City of Corona

Department of Water and Power

755 Corporation Yard Way

Corona, CA 92880

Prepared by:

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June 2008

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1. Introduction

The City of Corona relies on three groundwater subbasins within their water service area for a portion of their water supply. In order to more actively manage this limited resource, the City and its technical consultants have prepared this Groundwater Management Plan (GWMP). The plan follows guidelines set forth in Assembly Bill (AB) 3030, which was promulgated in 1992 and allows local agencies to prepare and adopt GWMPs (California Water Code Sections 10750 through 10756). The bill was amended in 2002 by Senate Bill (SB) 1938, providing additional GWMP requirements. Such a plan allows the City to address issues of groundwater recharge and storage, critical components for effective management of the local subbasins and the City's water supply. This GWMP will be considered by the City for adoption on June 18, 2008 in accordance with AB3030 timelines (the press release for the public hearing is included in Appendix A).

1.1. GWMP Plan Goals and Objectives

The Goals of the GWMP include:

- Operate the groundwater basin in a sustainable manner for beneficial uses
- Increase the reliability of water supply for basin users

To support these goals, the City has determined the need to better understand the hydrogeology and groundwater conditions of the underlying basins and, based on this understanding, develop appropriate management objectives and strategies to achieve these goals.

The Plan area covers three groundwater subbasins within the City's water service area and sphere of influence. The City has conducted groundwater production and management activities in these subbasins for more than 40 years. These three subbasins, Temescal, Coldwater, and Bedford, are located in western Riverside County in the Santa Ana River Watershed as shown on Figures 1 and 2 (all figures are at the end of the text in this document).

1.2. Scope of Work

The City, along with input from Todd Engineers and AKM Consulting Engineers, developed a scope of work for the preparation of the GWMP including a series of nine tasks as listed below:

- Provide Public Outreach
- Identify Study Area and Compile Data
- Develop Data Management System

- Assess the State of the Basins
- Construct a Groundwater Model
- Develop Groundwater Basin Management Objectives (BMOs)
- Develop Groundwater Management Strategies
- Evaluate Management Alternatives
- Prepare a GWMP

The City took the lead on the public outreach process, described in more detail in the following section. The Study Area is defined as the groundwater subbasins underlying the City's water service area and covers approximately 30,000 acres (47 square miles) (Figure 3). To support the development of an AB3030 GWMP, relevant hydrologic and hydrogeologic data for the Study Area, as well as the contributing watersheds, were compiled and analyzed. The analysis provides for an historical assessment of available data as well as more detailed analysis over a 15-year Study Period.

Collectively, these analyses are used to describe the "state of the basins" with respect to groundwater use, water levels, quality, and storage. Based on this assessment, basin management objectives and management strategies to achieve those objectives were developed. The management strategies were further evaluated by the development, calibration, and application of a numerical groundwater flow model. The GWMP also includes a schedule for implementation of the management strategies.

1.3. GWMP Organization and Preparation

The organization of this GWMP generally follows the tasks described above. Tables are incorporated into the text and numbered within each chapter of the document. All figures are provided at the end of the text in a separate section to allow referencing throughout the text and to prevent duplication of figures. This introductory chapter provides the background and context for the GWMP. Chapter 2 describes the data compilation process for the analyses conducted. Chapter 3 describes the hydrogeologic assessment of the state of the groundwater basins. A brief description of the City's current and projected water demand, along with water sources, is included in Chapter 4 to provide context for the City's future reliance on groundwater as one of the sources of water supply. Basin Management Objectives and strategies to meet those objectives are provided in Chapters 5 and 6, respectively. Chapter 7 provides an implementation schedule for the GWMP. References are summarized in Chapter 8. Appendix A contains documentation of the stakeholder process. Appendix B summarizes the City's current monitoring program and makes recommendations for future improvement. Appendix C describes the development of a numerical groundwater model to assist with the evaluation of key management strategies. Appendix D contains a feasibility study for recycled water recharge in the Bedford

Subbasin conducted separately for Lee Lake Water District (LLWD) and included as part of this GWMP.

The development of the GWMP was a collective effort by the City and its technical consultants. The City provided key data and led the public outreach program. Todd Engineers led the data compilation and hydrogeologic assessment of the groundwater subbasins. Todd Engineers also constructed, calibrated, and applied a numerical groundwater model of the Temescal Subbasin for the analysis of selected groundwater management strategies. AKM assisted with details on the City's water supply and wastewater systems, future water demand, and the identification of key management strategies.

1.4. Public Outreach

In order to encourage public participation and keep local agencies informed, the City conducted a public outreach program associated with the GWMP. The City developed a stakeholder list to specifically invite interested parties to public meetings and inform them on plan preparation. Public notices, a Stakeholder List, and an adopted resolution to prepare the GWMP are provided in Appendix A. Public outreach activities are summarized in the following sections.

1.4.1. Notice of Intent to Prepare an AB3030 GWMP

On June 6, 2006, the City notified the public that a public meeting was scheduled to consider whether the City should prepare a GWMP. In the public notice, provided in Appendix A, the City invited all landowners and interested parties to attend the hearing and express their interest in the GWMP process. The City also made available advance copies of the resolution that was being considered. The notice described how interested parties could participate in the GWMP development by either attending the hearing or submitting a written request to the City.

At the public hearing on June 21, 2006, the City invited the public to comment on the GWMP process and pending resolution. No comments were made, and the Resolution of Intent to Prepare a Groundwater Management Plan was adopted. A copy of the signed resolution is provided in Appendix A.

1.4.2. Neighboring Agencies and Service Areas

Figure 4 shows the service areas of agencies in the region that provide water supply to the area. The City shares the three groundwater subbasins with the City of Norco, Home Gardens County Water District, Lee Lake Water District (LLWD), and Elsinore Valley Municipal Water District (EVMWD). LLWD is participating in the GWMP and is proposing a groundwater recharge project with recycled water in the Bedford Subbasin. This project is included as a groundwater management strategy in this GWMP and is evaluated separately in Appendix D.

1.4.3. Public Meetings

In addition to the public hearings held in accordance with the GWMP process, two public workshops were conducted on December 11, 2007 and May 20, 2008. At the December workshop, the assessment of the groundwater basin was presented along with preliminary basin management objectives (BMOs) and potential management strategies to achieve those objectives. Representatives from LLWD, Western Municipal Water District (WMWD), Orange County Water District (OCWD), EVMWD, Chandler's Sand and Gravel, Riverside County Waste Management Department (RCWMD), and other parties attended the workshop. GWMP information and a copy of the technical presentation were posted on the City's website prior to the meeting.

In the May workshop, the Draft GWMP was reviewed including the final BMOs, evaluation of the management strategies, and the implementation schedule. Representatives of WMWD, EVMWD, Santa Ana Watershed Protection Agency (SAWPA), Chandler's Sand and Gravel, Riverside County Flood Control and Water Conservation District (RFCWCD) and Inland Empire Waterkeeper attended the workshop. The Draft GWMP was posted on the City's website prior to the meeting. Written comments on the Draft GWMP were provided by WMWD, RFCWCD, RCWMD, and Inland Empire Waterkeeper. Those comments have been incorporated into this GWMP, or in some cases, marked for further review during the EIR process.

1.4.4. Meetings with Neighboring Agencies

Two informal meetings were also held with neighboring agencies on the GWMP process. On January 22, 2008, City consultants provided an update of the GWMP development to the Lee Lake Water District (LLWD) Board of Directors at their request. The City and consultants also met with consultants of the Chino Basin Watermaster at their request on March 18, 2008 to discuss the GWMP progress and mutual interests with respect to data sharing and groundwater modeling.

1.5. Environmental Review

In compliance with the California Environmental Quality Act, the City has embarked on an environmental review of the GWMP. The process will evaluate the strategies included in the adopted GWMP in a Programmatic Environmental Impact Report (PEIR). The City has already retained the services of Environmental Science Associates (ESA) to prepare the PEIR, which will commence after the GWMP has been adopted. Preparation of the PEIR will involve public notification and hearings on potential environmental impacts of the GWMP. The City may decide to update or modify components of the GWMP in the future based on the environmental review process.

2. Data Compilation and Management

To support the development of an AB3030 GWMP for the City, relevant hydrologic and hydrogeologic data for the groundwater basins and contributing watersheds have been compiled. A Study Area and Study Period were defined early in the process to guide the data collection effort. The data collection process occurred mainly in 2006 and resulted in relatively complete data sets through 2004. In addition, data collected since 2006 are incorporated as noted throughout the GWMP. The City's water production and purchases are updated through the end of Calendar Year 2007 in Chapter 4. Other historical data were collected when available, but a focused effort was made to compile data covering an approximate 20-year period dating back to the mid-1980s.

A Data Management System (DMS) was designed to organize available data, support technical analyses, and identify data gaps. This system includes a relational database in Access format with individual tables for each data type. A project Geographical Information System (GIS) has also been maintained as a repository for regionally-available GIS files and for viewing and analyzing spatial data. The database and GIS were also used to facilitate the construction of a numerical model to assist in the evaluation of management strategies. Collectively, the GIS and project database provide a framework that will allow additional data to be incorporated and analyzed in the future. The Study Area, Study Period, and data collection efforts are described in the following sections.

2.1. Study Area

A Study Area for the Groundwater Management Plan was defined by the groundwater subbasins of interest, the contributing watersheds, and portions of the adjoining groundwater basins (Figure 3). The Study Area is larger than the groundwater subbasins to be managed in order to incorporate inflows from other groundwater basins and evaluate the subbasins of interest in a regional context.

Subbasin nomenclature and boundaries follow those included in the California Department of Water Resources (DWR) document, *California's Groundwater*, commonly referred to as DWR Bulletin 118 (DWR, 2003). Portions of Bulletin 118, including descriptions of individual groundwater basins, are updated periodically by DWR. The Study Area subbasins were updated on February 27, 2004 and those descriptions are used in this document (DWR February 27, 2004a; 2004b; 2004c). Subbasins and contributing watershed areas, as determined through GIS, are summarized in the table below.

Table 2-1
Groundwater Basins and Watersheds

DWR Groundwater Basin (Basin No.)*	Subbasin (Basin No.)*	Subbasin Area (acres)	Contributing Watersheds (acres)	
			Western	Eastern
Upper Santa Ana Valley (8-2)	Temescal (8-2.09)	23,500	13,999	12,549
Elsinore (8-4)	Coldwater (none)	2,176	9,525	0
	Bedford (none)	4,133	0	11,858
	Total	29,809	23,524	24,407

*DWR Bulletin 118, February 27, 2004a., b., c.

The Temescal Subbasin is a recognized subbasin in Bulletin 118. The Elsinore Groundwater Basin, the adjoining basin to the southeast, is not formally divided into subbasins in Bulletin 118. However, two areas within the northern portion of the Elsinore Basin, Coldwater and Bedford, have been designated as subbasins in past investigations (DWR, 1959). Because these subbasins can be readily defined as distinct from the remaining subbasins to the south, they are included as separate subbasins in the Study Area for the purposes of this GWMP.

2.1.1. Subbasin Boundaries

The Temescal Subbasin as defined by DWR is bounded on the west by the Santa Ana Mountains and the east by low-lying El Sobrante de San Jacinto and La Sierra hills. The subbasin is connected to three adjacent groundwater basins. The boundary with the Chino Subbasin (DWR Basin No. 8-2.01) to the north is generally marked by the Santa Ana River and a series of low-lying hills in the Norco area (Figure 3). Groundwater flows into the subbasin from the Riverside-Arlington Subbasin (DWR Basin No. 8-2.03) through the Arlington Gap, a restriction in the southwestern arm of the Riverside-Arlington Subbasin (Figure 3). The southern boundary of Temescal Subbasin is located at a constriction of the alluvium along Temescal Wash at Bedford Canyon where it connects with the Bedford Subbasin of the Elsinore Groundwater Basin (DWR Basin No. 8-4).

The subbasin also includes a small subarea west of the La Sierra Hills and east of the Santa Ana River (DWR, February 2004a). This northeastern arm of the Temescal Subbasin, referred to as the Norco area, consists of relatively low permeability alluvium and bedrock residuum flanked on the east and west by bedrock outcrops. Investigators in the Chino Subbasin include a portion of this area within the boundary of the Chino Basin (WE, July 2005). This division may be technically supported by a groundwater divide indicated by water level data in the Norco area with groundwater in the northern portion flowing toward the bluff along the Santa Ana River.

The Bedford Subbasin connects to the Temescal Subbasin near the base of Bedford Canyon. The connection occurs where the alluvium along Temescal Wash thins as the wash leaves the subbasin and traverses northward through bedrock (a reach referred to as Temescal Canyon) before entering Temescal Subbasin.

The Coldwater Subbasin connects to the Bedford Subbasin along a trace of the Glen Ivy Fault zone, a locally named fault related to the larger basin-bounding Chino-Elsinore Fault zone. Since the delineation between the two subbasins has historically been the surface trace of a groundwater-impeding fault, the fault trace mapped by the U. S. Geological Survey (USGS) was used as the subbasin boundary (USGS, 2004).

2.1.2. Contributing Watersheds

The Temescal Subbasin receives runoff and recharge from almost 14,000 acres of uplands in the adjacent Santa Ana Mountains. Watersheds contributing runoff from the east are almost as large, but contribute less runoff because of lower elevations and corresponding precipitation. Watersheds contributing runoff to Coldwater and Bedford subbasins cover 9,525 acres and 11,858 acres, respectively, more than three times the area of the subbasins. Although the watershed contributing runoff to Bedford Subbasin is more than 2,000 acres larger than the Coldwater watershed, the Coldwater Subbasin receives more runoff due to the higher watershed elevations.

2.2. Study Period

An initial review of documents and data was used to define a Study Period to guide ongoing data collection and the water balance. Study Period selection considered significant changes that may have an effect on the groundwater basin such as land use, population growth, imported water, and groundwater production. The availability and quality of historical data were also considered. Selecting a relatively recent period makes good use of available data and represents the current state of the basin, including changing land use and management.

Rainfall patterns and hydrologic cycles were also reviewed to select a representative Study Period. Average annual rainfall within the Temescal Subbasin, along with a cumulative departure curve is provided on Figure 5. Based on the data review and rainfall patterns, a Study Period from water year 1990 through water year 2004 (15-year period) was selected for focused data collection. This period contains a range of wet and dry cycles and approximates long-term average precipitation. The average annual rainfall for the Study Period is about 15 inches per year, in good agreement with the average of 15.7 inches per year at the Chase precipitation station (Figure 5). The Study Period begins in drought conditions when water levels in the basin are relatively stable. The period also contains a full wet and dry cycle (as indicated by the cumulative departure curve) to allow assessment of climatic variations in the water balance (Figure 5).

The Study Period also allows for evaluation of changes in water demand and supply. Although the City has grown steadily in population since its inception in 1896, significant population increases occurred between 1960 and 1970 and between 1985 and 1995. During each of these two decades, population doubled (AKM, April 2005). From 1985 to 2004, the population more than tripled, increasing from 45,750 to 144,274. Current population is approximately 149,400 (2008). Accompanying this growth was a change from predominantly agriculture to more urban land uses and a large increase in urban water demand. Much of the demand increase through the 1990s was met with an increase in imported surface water supplies. However, over the last five years, groundwater production increased from about one-third of the City's supply to about one-half, an increase contained within the Study Period.

Although the more quantitative assessments including the groundwater basin water balance and numerical modeling were conducted for the Study Period, additional historical data were also compiled. These documents and data provide useful information on the conceptual model of the three subbasins and changes in groundwater conditions over a relatively long time period.

2.3. Data Types and Sources

Data collected for the GWMP are summarized below by data type and are described in more detail in following sections.

- **Hydrologic** – Climatic data (e.g., precipitation and evapotranspiration), reservoir storage, and streamflow.
- **Land Use** – Land use maps over time indicating areas of agriculture, urban growth, and open space corresponding to changing water use, irrigation, and pumping patterns.
- **Geology** – Maps of geologic units and faults, lithologic information from wells, and soil types.
- **Groundwater** – Subbasin boundaries, well locations and construction, pumping tests, water levels, and ambient groundwater quality.
- **Water Quality** – Data included water quality analyses from municipal wells compiled from the City and the California Department of Public Health (DPH) (formerly the Department of Health Services). Data were also collected for Regulated Facilities in the Study Area. These data include water quality analyses conducted and compiled by the City as required by state regulations. Data were obtained from the Regional Water

Quality Control Board (RWQCB) and other local agencies relating to basin water quality from monitoring at commercial or industrial activities.

- **Water Supply** – Drinking water and other water uses from groundwater pumping (by the City and others), imported water, and recycled water.
- **GIS Base Maps and Layers** – Supporting physical and cultural information were compiled for use in the project GIS such as roads, freeways, city limits, parcels, sphere of influence, building footprints, digital elevation models, streams, rivers and lakes, and other data.

Primary sources of data for this GWMP were local and state public agencies including the City, County of Riverside, RWQCB, USGS, DWR, and the Santa Ana Watershed Protection Agency (SAWPA). SAWPA, in particular, was a helpful resource for filling key data gaps and acquiring physical and cultural data for the GIS base maps. SAWPA was first formed in 1968 as a planning agency, and reformed in 1972 with a mission to plan and build facilities to protect the water quality of the Santa Ana River Watershed (SAWPA, 2006). Within SAWPA, the Information Systems and Data Management team develops and maintains water-related data that are used by SAWPA staff for data analysis and dissemination. These data are available online through the Santa Ana Watershed Data Management System (SAW DMS, 2006).

2.4. Hydrologic Data

The main sources for hydrologic data in the Study Area included the California Irrigation Management Information System (CIMIS), County of Riverside, National Weather Service, and USGS as described in more detail below.

2.4.1. Climate Data

Precipitation data were available for four stations in the Santa Ana River Watershed as shown on Figure 2. Location data for each station are also included in the DMS. Data for the University of California Riverside Station # 44 were downloaded from the California Irrigation Management Information System (CIMIS) website. Data for the Chase, Norco, and Elsinore stations were obtained from the County of Riverside. Data are available monthly from June 1965 to the present for the three county stations (Chase, Norco, and Elsinore) and from June 1985 to the present for the CIMIS station.

The spatial distribution of average rainfall (isohyetal maps) in the Study Area was available from several sources. SAWPA files contained an isohyetal over the entire Santa Ana River Watershed (Figure 2). A long-term average isohyetal map was also obtained from the Oregon Climate Service (OCS) and Oregon State University using PRISM (parameter-elevation regressions on independent slopes model), a climate modeling and mapping system (OCS, January 8, 2007). The PRISM Group, supported by numerous agencies and used by DWR, models complex precipitation patterns over large areas to develop a more accurate predictive precipitation tool. This PRISM isohyetal map was used in the basin water balance and is shown on Figure 6.

Monthly evapotranspiration (ET) data were available from June 1985 to May 2006 for the CIMIS station. Long term pan evaporation data from 1948 to 2005 were compiled from an additional station in Riverside County (Riverside Citrus Exp. St. Station). These data, along with other information such as annual ET coefficients for various crops were downloaded from the DWR Division of Planning and Local Assistance (DPLA) website. The DWR DPLA divides the state into Detailed Analysis Units (DAU) for purposes of data reporting. The City is located in the North Riverside DAU. Both reference ET data and crop coefficients were added to the DMS.

2.4.2. Streamflow

Surface water gage data for Temescal Wash were available from the USGS National Water Information System (NWIS) as shown on Figure 7. Data from one active and several inactive gages were compiled. For the gage located along Temescal Wash between Bedford and Temescal subbasins (USGS Station no. 11072000), daily data were available from October 1928 to June 1980. For the active gage in the City near Main Street (11072100), daily flows from October 1980 to April 2007 were downloaded and added to the DMS as a separate table.

2.4.3. Reservoir Storage

Lake Mathews is used to store much of the imported water that supplies the City (Figure 3). Monthly reservoir storage data from October 1961 to May 2006 were downloaded from the California Data Exchange Center (CDEC) and included in the DMS.

2.5. Water System Data

2.5.1. Pumping Data

The City provided numerous pumping summary tables in pdf format on a compact diskette (CD). This CD contained annual pumping data by well from 1964 to 1999 for City wells, with some data gaps (e.g., data for years 1994 to 1999 appear to only include Wells 1-4, 20, and 21). In addition to the annual data, monthly data were available for calendar year 1988 and from January 1990 through December 2004 (except for July 1996 through December 1996). Monthly data were summed to yield annual pumping by well and combined with the available annual data.

City production data were also available from a consulting firm, Water Master Support Services (WMSS), which compiles production data with the WMWD service area (including the City of Corona). These data were provided by the WMSS on a CD. Data included both tabulated reports in pdf format as well as an electronic table of production data in MS Access format. Data include pumping by the City and 56 other users in the Study Area from 1947 to 2004.

Production totals from the City tables were compared to production amounts contained in the WMSS data in acre-feet per year (AFY). Pumping totals were almost identical from 1995 to present, but varied somewhat in the earlier years (1964-1995). The total production error between these two data sets was judged to be relatively small when using known City wells (amounting to a discrepancy of a few percent of AFY produced), and the City's monthly pumping data were used when available.

The largest discrepancy in the WMSS data was the large number of production wells that were allocated to the water supply system, but are not necessarily City wells. This discrepancy was more prevalent during the early portion of the Study Period than later years. Research conducted on several of these wells indicated that they were irrigation wells at parks throughout the City and/or older wells previously owned by others that were subsequently obtained by the City and abandoned. For example, two older wells thought to be previously owned by Orange Heights Water System (and designated MAIN 3 and MAIN 4) were on the property obtained by the City for the construction of City Hall. While there were no records to independently verify historical production totals from these wells, locations and pumping totals were reviewed for reasonableness and generally left unmodified in the production database.

2.5.2. Imported Water Data

The City imports water through WMWD from the Colorado River and the State Water Project. Data on imported water volumes at the main treatment plants and system interties were provided by the City for this project. Annual data were provided from 1964 through 1999 and monthly data were available from 1990 through 2004. These data are included in the DMS with the pumping data.

2.5.3. Water Demand

The City's 2005 update of its Urban Water Management Plan (UWMP) contains statistics on water demand (including population, number of housing units, and population per household) in 5-year increments from 1970 to 2003 (AKM, December 2005). Population data for various time periods from 1900 to 1960 are also available in the UWMP.

2.5.4. Wastewater Treatment Plant (WWTP) Data

Information from the City of Corona's three WWTPs and the volume of discharge to ponds and Temescal Creek were provided by the City from 1997 to present. Earlier data were apparently destroyed accidentally and were estimated for this GWMP using verified methods and City information on discharge locations. Additional operation and location information was available in the National Pollutant Discharge Elimination System (NPDES) permits issues by the RWQCB.

2.6. Groundwater Data

Groundwater data were compiled from multiple sources including DWR, SAWPA, Riverside County, and the City. Groundwater data available from SAWPA includes groundwater elevations, general analytical chemistry, and well construction information compiled from 37 local agencies (water districts, cities, counties). However, complete data, including well construction and water levels or quality, were available for only a few wells in the Study Area.

2.6.1. Basin and Watershed Boundaries

DWR publishes maps and descriptions of California groundwater basins in DWR Bulletin 118. This document and the accompanying basin descriptions are updated periodically. Basin descriptions for the Study Area were updated in February 2004. The last update for the basin map was in 2003. Groundwater basin boundaries are available in GIS-compatible data files and were obtained from DWR for groundwater basins in the Study Area. Since Temescal is a DWR-defined subbasin, the delineation of this subbasin was available in the files and has been used unmodified in this study.

Because Coldwater and Bedford subbasins are not delineated in the DWR files, GIS shape files were created for these subbasins. Subbasin boundaries were based on previously-defined boundaries and the location of geologic faults (DWR, 1959; MWH, 2004; USGS, 2004). The Coldwater Subbasin was delineated from the larger Elsinore Groundwater Basin boundaries on the west, north and south, and the location of the North Glen Ivy fault on the east as mapped by USGS (2004). The Bedford Subbasin boundaries are coincident with the Elsinore Groundwater Basin boundaries on the north and east and the North Glen Ivy fault on the west. The southern boundary was based on the narrowing of Temescal Wash through surface bedrock outcrops, and checked for similarity to boundaries previously published (DWR, 1959). These modified subbasin boundaries are shown on Figures 1 and 3 and used in calculating subbasin areas in this GWMP.

The contributing watershed areas for the subbasins in the Study Area were delineated digitally by Todd Engineers, using GIS software to create shape files of the defined watersheds. Watershed delineation relied on electronic USGS Digital Elevation Models (DEM) (10-meter resolution) and topographic elevation contours of the Santa Ana quadrangle provided by USGS (2004). DEM files were processed in ArcView to provide shaded relief maps, slope percentage maps, slope aspect maps, and elevation contour maps at varying contour intervals. These maps were combined with the USGS elevation contours, hydrologic features, and DWR groundwater basin boundaries to manually delineate watershed boundaries. Watersheds were defined to include those areas that could potentially contribute surface runoff to the three main Study Area subbasins and are shown on Figure 3.

2.6.2. Well Data

Well locations and construction information tie key data (e.g., pumping, water levels, and water quality) to spatial and vertical locations within the groundwater basin. Sources of well locations and construction include SAWPA, DWR, the City, and Riverside County.

SAWPA provided a list of 312 wells in the Study Area, 174 of which contained detailed location data (latitude/longitude) and 60 of which contained some well completion information (e.g., depth, screen intervals, and casing). SAWPA well data were included in the DMS as a separate table maintaining the format from the original data source.

A database was created by Todd Engineers of selected DWR Driller's Log data for approximately 325 wells. These data are included as a separate table in the DMS. Completion dates for these wells range from 1905 to 2004, but approximately half of these wells were drilled after 2000. Locations of 131 of the wells with Driller's Logs were estimated using the state well number and added to the DMS. The Master Well table within the DMS contains a field for each record indicating the method used to locate the well. The method of the DWR wells location is noted as "manual" to indicate the approximate nature of the placement. An older DWR document (1959) lists 112 wells in the Temescal, Coldwater, and Bedford subbasins that were drilled before 1959, most of which are listed as irrigation or domestic wells. The earliest completion date is 1912, but completion dates are unavailable for most wells in the document. Because key hydrologic and hydrogeologic data cannot be tied to these individual wells, these well data have not been included in the electronic DMS.

Construction information for the City's 31 wells (including inactive and abandoned wells) were compiled from several documents including the Water Master Plan (AKM, April 2005), the Drinking Water Source Assessment and Protection Plan (DSWAP) (Kennedy/Jenks, 2002), and a focused hydrogeologic assessment document prepared for the City's desalter facility (Fox/Roberts, 2004). Data were entered into Excel spreadsheets and re-formatted into a separate table in the DMS.

The U.S. Geological Survey compiles and publishes well information such as well location, construction, and available water level data through a web based portal, the National Water Information System (NWIS). The system was queried for wells in the Study Area, and 18 wells with location data were identified and added to the DMS.

Well construction data were also available from a limited database that Riverside County initiated in 1990. Any well drilled after 1990 in the County is included in the database and earlier wells are being added as resources become available. The County database contains 683 wells in the Corona area, most of which are relatively shallow monitoring wells (551 wells or 81 percent). The remaining 132 wells are listed as municipal (2 percent), domestic (5 percent), irrigation (3 percent), or unknown (9 percent) wells. The County well database was also included as a table in the DMS.

Well location and construction data from all sources were compiled into one table in the DMS. Some wells may be duplicated in this table as it difficult to match wells between sources. Data from each source were also retained as a separate table in the DMS for updating and archiving purposes.

2.6.3. Water Level Data

Water level data in the Study Area were available from SAWPA and the City. Approximately 100 wells contain at least one water level measurement ranging from June 1919 to September 2004. The number of groundwater elevation measurements per well varies from 1 to 1,083 distinct monitoring events. Each well with water level data has been assigned a unique ID that links the water level data to other well information, such as location and construction, if available. Water level data were also available for City wells from 1998 to 2005. Water level data from both SAWPA and the City were re-formatted and entered into the DMS.

No historical water level contour maps could be found in previously published documents that covered the Study Area. A few water level contour maps were available for relatively small portions of the Study Area for a few time periods. The earliest available water level contour map is a DWR map for March 1957 water levels (DWR, 1959). The map covers the northern portion of the Study Area and small sections of the Elsinore Groundwater Basin to the south. Wells used to construct the map are provided in a summary table, but actual water level measurements in each well were not included in the report and therefore are not included in the DMS.

2.6.4. Water Quality Data

Ambient groundwater quality data were available from the City, SAWPA, and DPH. SAWPA water quality data were available from 101 wells. The number of monitoring events per well varied from 1 to 180. The average number of constituents analyzed per event per well ranged from 2 to 50.

DPH requires water quality sampling of drinking water systems larger than six connections. The Division of Drinking Water and Environmental Management (DDWEM) compiles these data into a statewide database. The database was obtained from DPH and queried for all wells, surface water, and intermediate system connections in the Corona area. Water quality data were available for 69 stations, 39 of which were operated by City of Corona. Other owners include the City of Norco, Glen Eden, Home Gardens, and California Rehabilitation Center. The number of monitoring events per well ranged from 1 to 567. Most monitoring events included the full suite of Title 22 drinking water constituents.

2.6.5. Regulated Facilities

Potential threats to groundwater quality are regulated by RWQCB, Department of Toxic Substance Control (DTSC), and the Riverside County Department of Environmental Health. A review of the RWQCB database identified 30 major sites that are regulated for possible environmental releases in the Corona area and approximately 75 Underground Storage Tank (UST) investigations. Of non-UST sites, 18 are regulated by the Spills, Leaks, Investigations, and Cleanup (SLIC) Program at the Santa Ana RWQCB and two are landfills. The remaining 10 sites are regulated by DTSC.

Data collection has focused on facilities whose discharge is regulated by the RWQCB, sites that are being investigated for impacting groundwater, and leaking underground storage tank sites. Data include location, site characterization, water quality, and other information.

A file review was conducted at the Santa Ana RWQCB in July 2006. Groundwater quality and other environmental data were copied from 11 sites. Electronic databases were unavailable and data were evaluated from paper copies and not hand entered into the DMS. Water quality data for four UST investigations are available from the State Water Resources Control Board (SWRCB) online through their data management system, Geotracker. These data were included as a table in the DMS.

2.6.6. Land Use Data

Land use maps in the form of GIS shape files were available from the DWR DPLA and the Department of Conservation Division of Land Resource Protection (DC DLRP). DWR DPLA conducts complete land use surveys approximately once every ten years for the Upper Santa Ana River Drainage Area. The most recent survey, 1993, was available from the DWR website as a GIS shape file. A summary table of this map, which includes the total area by land use type within the basin and watershed area, was added to the DMS. Additional surveys (years 1957, 1964, 1975, 1984) were available on paper from DWR, but were not converted to electronic format and are not included in the DMS.

In addition to land use data, DWR DPLA also publishes data on applied irrigation rates for specific crop types in each DAU. Data were available on the DWR website for 1998 through 2001. A table of the water use (AFY per acre) for each crop type for the North Riverside DAU was included in the DMS.

The Farmland Mapping and Monitoring Program (FMMP) of the DC DLRP determines the area of farmland in the state on a biennial basis. In Riverside County, maps showing farmland and urban areas are available for the even years 1984 to 2004 in GIS (shape file) format. Summary tables with the total amount of agricultural land by year for DWR and FMMP are included in the DMS.

The City provided a detailed parcel map for the project GIS with information regarding the zoning of each parcel. These parcels, differentiated by zoning type, were compared with the other sources of land use to confirm areas of urban and agricultural land.

2.7. Geologic Data

USGS data provided the primary source of geologic units and faulting in the Study Area. Additional documents and data were used as described below.

2.7.1. Geology Maps

A digital geologic map of the Santa Ana 30’ x 60’ quadrangle was obtained from USGS (2004) and imported into GIS. A summary table, including the total area of each geologic unit, was added to the DMS.

2.7.2. Lithologic Data

Subsurface lithologic data were available from DWR Driller’s Logs (400 paper logs compiled), available City well-completion reports, and geophysical logs for six City wells. Lithologic information was also available for 10 wells in the SAWPA database.

2.7.3. Soils Data

Soil type and the respective soil moisture holding capacity governs the amount of recharge and runoff that occurs in an area. Digital soil maps and a database of physical properties for soils in Riverside and Orange counties were downloaded from the Natural Resources Conservation Service’s (NRCS, formally the Soil Conservation Service) website. In addition, the NRCS also provides a methodology for estimating the amount of runoff that occurs based on land use type. A summary table of the acreage associated with each soil type was added to the DMS.

2.8. GIS Files and Layers

The City maintains a GIS and provided numerous shape files in support of this project including parcels, city limits and sphere of influence, roads, storm detention basin locations, production well locations, and a high resolution aerial photograph. In addition, numerous GIS files were obtained from the Santa Ana Watershed Project Authority (SAWPA) from an online user system. These files included physical and cultural features as well as limited groundwater data sets such as water levels and water quality. Additional GIS files were downloaded from various sources as previously mentioned.

2.9. Data Management System (DMS)

The DMS includes one main relational database in Access format with individual tables for data types summarized above. A summary of the tables included in the DMS relational database is provided on Table 2-2 below. This database provides a flexible framework, allowing additional data to be incorporated as available. The project GIS was populated with shape files generated from selected data sets as well as selected publicly- or commercially-available GIS layers as described above.

Table 2-2
Data Tables in the Data Management System (DMS)

DMS Table Name	Description	Source(s)
Geo_Geology	A summary table for the geologic map containing formation names and area in subbasins and watersheds	USGS
Geo_Lithology	Lithologic information for select wells in the area	SAWPA
Geo_Soils	A summary table of the soils map containing soil types and associated areas within the subbasins and watersheds	NRCS
GW_AB County	Abandoned wells as documented by Riverside County	COUNTY
GW_County Wells	Wells from the Riverside County Well Database	COUNTY
GW_DWRLOGS	Information from DWR Driller's Logs	DWR
GW_Master Wells	A composite table of wells from all available sources. Includes a unique ID for each well and location information	DWR, COUNTY, SAWPA, CITY, WATERMASTER
GW_Water Quality	Ambient groundwater quality for select wells in the area	SAWPA
GW_Well Construction	Well construction information for wells in the area	SAWPA, CITY
GW_Well_Perf	Screened interval information for select wells in the area	SAWPA
GW_WL_ALL	Groundwater elevations for select wells in the area	SAWPA, CITY
HY_ET_CIMIS	Monthly reference evapotranspiration data	CIMIS
HY_ET_K	Annual evapotranspiration and crop coefficients for the DAU	DWR DLPA
HY_Precip	Monthly precipitation data from 4 stations	CIMIS, COUNTY
HY_Precip_Stations	Location information for the precipitation stations	CIMIS, COUNTY
HY_Res_Storage	Monthly reservoir storage in Lake Mathews	CDEC
HY_Streamflow_Temescal	Streamflow on Temescal Wash	USGS
LU_Applied Water Use	Applied water use (AFY/acre) for crop types in the North Riverside DAU	DWR
LU_DWR_SUMMARY	A summary table of the DWR 1993 land use map containing land use areas within the subbasins and watersheds	DWR DPLA
LU_Summary_Farm Mapping	A summary table of the farmland mapping program land use maps, contains land use areas with the basin and watershed by year	DC
RF_Locations	Location data for regulated facilities in the area	RWQCB
WS_Annual Pumping	Annual pumping from the City of Corona by well	CITY
WS_Monthly Pumping	Monthly pumping from the City of Corona by well	CITY
WS_Watermaster_Pumping	Annual pumping for the groundwater basins	WATERMASTER

This process was the City's first effort to compile numerous types of hydrologic and hydrogeologic data into a comprehensive database for future updating, revision, and use. Numerous inconsistencies and duplicative data types were noted as data were compiled from various sources. Data sets were evaluated for quality control as needed, but only minimal deletions or modification have been made to preserve data that may be potentially important in the future.

3. State of the Groundwater Basins

The groundwater subbasins of the Study Area have undergone significant changes since groundwater development began in the early 1900s (DWR, 1959). Since that time, the groundwater subbasins have supported a variety of uses including extensive agricultural irrigation (especially citrus), industrial demand from mining and citrus packaging, and increasing urban use. Early agricultural activities in the subbasins were supplemented by diversions of surface water imported into the basin. Agricultural reliance on groundwater increased through the 1940s and 1950s, apparently peaking in the early 1960s but continuing into the 1970s. Increasing urban use has replaced most of that early agricultural demand.

The Study Area subbasins occupy a small portion of the upland Santa Ana River watershed, which covers more than 1.5 million acres in San Bernardino and Riverside counties (Figure 2).The Study Area subbasins cover about 47 square miles (about 30,000 acres) in western Riverside County (Figures 2 and 3) and include portions of townships/ranges 3S/6W, 3S/7W, 4S/6W, 4S/7W, and 5S/6W. The subbasins and the local watersheds that contribute runoff are contained within an approximate 400-square mile area outlined in Figure 3.

3.1. Land Use

Current and historical land use in the Study Area is shown on the land use maps on Figure 8. Two maps, one from 1984 and one from 2004 illustrate changes in land use over the last 20 years. As shown on Figure 8, land use on the Study Area subbasins, especially Temescal Subbasin, is predominantly urban (shown by the pink color). The urbanization has progressed mainly over the last 35 years as population in the subbasin has risen and agriculture has moved out. A comparison of the two maps on Figure 8 illustrates the change from agriculture (green) to urban (pink) land use for large portions of Temescal, Coldwater, and Bedford subbasins.

In the 1950s and 1960s, the subbasins consisted mainly of irrigated agricultural lands with a variety of crops, especially citrus. In 1957, approximately 7,000 acres of Temescal Subbasin were under cultivation, 1,100 of which were devoted to citrus and avocado production near Corona (DWR, 1959). During that year, approximately 17,000 acre-feet per year (AFY) of groundwater were pumped from the basin, primarily for irrigation and citrus processing facilities with some municipal use (DWR, 1959). At that time, less than 10,000 people lived in the subbasin.

Agriculture and native vegetation were the predominant historical land uses in both Coldwater and Bedford subbasins. In 1957, about 1,700 acres were irrigated in the two subbasins. Although some urbanization has occurred in both subbasins, much of the land remains undeveloped. Sand and gravel mining has been the predominant industrial land use in Coldwater Subbasin, an activity that continues today.

Groundwater production data suggest that the peak of agricultural pumping in Temescal Subbasin was from about 1959 through about 1966, but irrigation continued through most of the 1970s. By about 1980, most of the growers and citrus processors had left the basin. The 1984 land use map on Figure 8 suggests that large portions of southern Temescal Subbasin continue to be used for agriculture, but most of this land was likely fallow or non-irrigated pasture by 1984. Groundwater production totals for the 1980s indicate that irrigation had decreased significantly in the subbasin.

The contributing watersheds that surround the subbasins consist mostly of native vegetation or grasslands used for grazing. With the exception of urbanization of the small watershed on the northeastern side of Temescal Subbasin, land use on the contributing watersheds has not changed significantly over the last 20 years.

The northern edge of the Study Area contains a portion of the Prado Dam Management Area, shown as native on the land use maps (see also Figure 7). The management zone, operated by the U.S. Bureau of Reclamation, is a 6,800-acre area generally defined by a ground surface elevation of 560 feet above mean sea level (msl) and serves as flood control for the Santa Ana River at Prado Dam.

3.2. Physical Setting

The groundwater basins are in a high desert setting in the rain shadow of the Santa Ana Mountains in western Riverside County. The basins are at the downstream portion of the Santa Ana River watershed.

3.2.1. Topography

The elevation of the ground surface in the Study Area ranges from below 500 feet msl at Prado Dam to more than 5,600 feet msl at the highest peak in the Santa Ana Mountain watersheds west of Coldwater Subbasin. The floor of Temescal Subbasin slopes from about 1,500 feet msl along the base of the Santa Ana Mountains in the southwest to about 500 feet msl in the northwest. The ground surface elevation in the city center is about 650 feet msl. In Coldwater Subbasin, elevations along the western mountain front are about 1,500 feet msl, similar to the Temescal Subbasin mountain front. The Coldwater Subbasin floor slopes to an approximate elevation of 1,000 feet msl near the eastern subbasin boundary along the Elsinore-Glen Ivy Fault zone. Bedford Subbasin slopes from about 1,100 feet msl on the south and west to about 850 feet msl on the northeast where Temescal Wash exits the subbasin (Figure 3).

Surface elevations increase significantly from the mountain front at the groundwater basin boundaries (about 1,500 feet msl) to the higher elevations in the contributing watersheds.

For the contributing watersheds in the Santa Ana Mountains to the west, elevations range from about 2,500 feet msl in the north to more than 5,600 feet msl in the south. The watershed west of Coldwater Subbasin rises above 5,600 feet msl. Watersheds east of the subbasins are significantly lower in elevation and rise only to about 1,800 feet in the highest areas east of Bedford and Temescal subbasins.

3.2.2. Precipitation and Evapotranspiration (ET)

Annual precipitation varies from below 12 inches to more than 26 inches over the Study Area. As shown on the isohyetal map on Figure 6, long-term average annual rainfall is between 12 and 14 inches per year on the basin floor and increases to more than 20 inches along the top of the local watersheds in the Santa Ana Mountains to the west.

The variability of rainfall on an annual basis is illustrated by the rainfall records from the Chase precipitation station, located in the southwestern portion of Temescal Subbasin (Figure 6). Over the last 40 years, annual rainfall at the Chase Station has ranged between about 4 inches per year to 34 inches per year with an average of 15.7 inches per year (Figure 5). Although the average rainfall of 15.7 inches per year since 1965 is slightly higher than predicted by the long-term isohyets on the figure, the Chase Station data illustrate the variability of rainfall in the Study Area. Annual rainfall totals range from less than 5 inches per year to more than 30 inches per year. Rainfall patterns indicate several wet and dry cycles persisting from about 4 to 8 years.

Data from the Chase Station are plotted as a cumulative departure curve on the lower portion of Figure 5. The graph relates annual rainfall to average rainfall as a percentage and indicates dry cycles with downward slopes and wet cycles with upward slopes. This plot more clearly demonstrates the wet and dry cycles that have occurred since 1965 and shows that only a few time periods can be characterized as average rainfall conditions.

Long term pan evaporation data from 1948 to 2005 were compiled from a station in Riverside (Riverside Citrus Exp. St. Station). These data indicate an annual potential evaporation of 75.66 inches per year ranging from 3.03 inches per month in December to 10.88 inches per month in July.

3.2.3. Streamflow

Temescal Wash (also referred to as Temescal Creek) is the primary surface water drainageway traversing from south to north across the Study Area draining the Temescal Valley (Figure 7). Originating south of the Study Area, the wash flows north through Bedford Subbasin, cuts through bedrock outcrops in Temescal Canyon, flows through Temescal Subbasin, and discharges to the Santa Ana River near Prado Dam. Streamflow in Temescal Wash is fed by storm water runoff and discharges from wastewater treatment plants within and upstream (south) of the Study Area. For example, Lee Lake Water District is currently allowed to discharge up to about 1,000 AFY of tertiary treated wastewater (although some is recycled for reuse) (RWQCB, September 6, 2001).

Temescal Wash is lined through most of the Corona city limits. The concrete lining begins around Magnolia Avenue, about 1.5 miles after Temescal Wash enters the Temescal Subbasin (from Temescal Canyon to the south, see Figure 7). The lined portion of the channel is indicated on Figure 7 and continues from Magnolia Avenue to the City's wastewater treatment ponds near the Prado Management Area. The only unlined portion in Temescal Subbasin is the 1.5-mile area where the wash emerges from Temescal Canyon. This area is characterized by high groundwater, likely the result of infiltration of streamflow and relatively fine-grained surficial deposits. Other than limited infiltration in this narrow section of the subbasin, Temescal Wash does not contribute significant recharge to the Temescal Subbasin.

The Study Area is also crossed by numerous drainageways originating in the surrounding watersheds to the east and west of the groundwater subbasins and draining toward the basin center. Drainageways originating in the Santa Ana Mountains west of the Study Area carry relatively large amounts of runoff into the subbasins.

Runoff from the Santa Ana Mountains into Temescal Subbasin has only limited opportunity for percolation into the groundwater basin. Drainageways are lined across the subbasin floor and funnel runoff into the lined portion of Temescal Wash. From there, runoff generally leaves the basin and provides surface discharge at Prado Dam. Some infiltration occurs in two large detention basins used for flood control near the western Temescal Subbasin boundary (Figure 7). These two basins, operated by the Riverside County Flood Control and Water Conservation District (RCFCWCD) and referred to as the Oak Avenue and Main Street detention basins, detain peak runoff from large storm events and allow for some infiltration to groundwater. Runoff into Coldwater Subbasin has the opportunity to percolate into the relatively permeable surface sediments. In addition, berms along washes, diversions of surface water, and the presence of large gravel pits enhance groundwater recharge of runoff in Coldwater Subbasin.

Stream gage data exist along Temescal Wash but are insufficient to document inflows and outflows at each of the subbasin boundaries. Streamflow data were available at only three locations along Temescal Wash within the Study Area as shown on Figure 7. The southernmost gage is an inactive USGS gage that measures flow in Temescal Wash in the bedrock outcrop between Bedford Subbasin and Temescal Subbasin. The northernmost stream gages are located in northern Corona before Temescal Wash enters the Prado Management Area.

Although currently inactive, the stream gage in the bedrock south of Temescal Subbasin (Site No. 11072000, Figure 7) provides data on the amount of runoff available for infiltration into the groundwater basin north of the gage. Daily measurements from October 1928 through June 1980 indicate an average annual discharge of 4,062 AFY. Annual averages vary significantly from less than 80 AFY during dry periods to more than 8,000 AFY. Discharge during several more recent wet and dry cycles (water years 1966 through 1979) averaged 4,488 AFY, in general agreement with the long-term average.

An active stream gage in the City of Corona (Site No. 11072100, Figure 7) measures runoff in the lined portion of Temescal Wash after additional stormwater discharge has entered the culvert. As such, flows at this gage are significantly higher than streamflow recorded to the south. Average discharge for the entire gaged period (1980-2006) is 19,575 AFY. This runoff leaves the subbasin and contributes to surface water outflow at Prado Dam.

3.2.4. Geology

The Study Area is located within one of the structural blocks of the Peninsular Ranges of Southern California. The groundwater basins occur in a linear low-lying block, referred to as the Elsinore-Temecula trough, between the Santa Ana Mountains on the west and the Perris Plain on the east (Norris and Webb, 1990). The trough extends from Corona to the southeast some 30 miles and was formed along an extensive northwest-southeast trending fault zone including the Elsinore, Chino, and related faults. The Elsinore and Chino fault zones bound the subbasins on the west and trend along the mountain front.

The oldest rocks in the Study Area crop out in the Santa Ana Mountains. These uplands are composed principally of volcanic (including the Santiago Peak Volcanics) and metamorphic rocks (including the Bedford Canyon Formation) of Jurassic and Cretaceous age. A thin rim of younger sedimentary units of Tertiary age crops out along the mountain front generally lying between the Elsinore and Chino faults. This zone of sedimentary units broadens to the north and contains numerous mapped formations of Cretaceous and Tertiary age. The northeastern side of the valley is flanked primarily by granitic rocks of Cretaceous age. Erosion of these units has filled in the trough over time resulting in quaternary-age alluvial fan, channel, and other deposits making up the permeable portions of the groundwater subbasins.

The geologic map on Figure 9 shows the distribution of these units in the Study Area. The original map was constructed by the USGS (2004), but several similar geologic units have been combined on Figure 9 to simplify the display. The main surficial deposits on the floor of Temescal Subbasin include younger and older alluvial fans deposited from the erosion of volcanic rocks and Bedford Canyon Formation to the west. These units prograde across the basin to the northeast and are truncated by channel deposits along Temescal Wash.

The Coldwater Subbasin is also composed of alluvial fan deposits, mainly from the Bedford Canyon Formation and adjacent granitic rocks. Volcanic rocks are essentially absent from the uplands adjacent to Coldwater Subbasin so the character of the deposits and groundwater chemistry differ from the alluvial fans to the north. The alluvial fan deposits in Coldwater Subbasin continue into Bedford Subbasin and appear to have been disrupted by faulting. Channel deposits along Temescal Wash define the eastern boundary of Bedford

Subbasin. In northern Bedford Subbasin, a variety of Tertiary sedimentary units crop out including the Silverado (Paleocene), Vaqueros (Miocene), Topanga (Miocene), and Puente (Miocene) formations.

3.3. Aquifers and Hydrostratigraphy

The basin-fill alluvial deposits and, to some extent, the underlying sedimentary units make up the aquifers in the basin. The thicknesses of these units vary significantly across the Study Area.

To further evaluate aquifer thickness and basin geometry, the base of the unconsolidated sediments was mapped as part of this GWMP. Lithologic descriptions from driller's logs were reviewed for evidence of consolidated sedimentary or igneous units (generally referred to in this document as bedrock) throughout the Study Area. These data were plotted in GIS and evaluated with surface topography and geologic outcrops to estimate a depth to bedrock beneath the subbasins. This surface was produced as a GIS raster file and color coded according to depth. The resulting map is shown on Figure 10.

As shown on the figure, the thickest portion of the alluvial basin (the deepest depth to bedrock) occurs in the central-west portions of the subbasins. The formation of a trough along the Elsinore-Chino Fault zone is indicated by the asymmetric basin geometry. The deepest depths occur along this zone as indicated by the orange and red colors. Unconsolidated sediments are estimated to be more than 1,000 feet thick in this area. Bedrock is much shallower in the eastern portion of the basin as indicated by the blue color on Figure 10. A slight deepening of the basin is indicated in the Arlington Gap by the lighter blue to green color. Here, unconsolidated sediments are approximately 250 feet thick. This area is interpreted to have been eroded by a branch of the ancestral Santa Ana River, accounting for the deeper base. Sediments throughout most of the Bedford Subbasin and in the Norco area are about 100 feet thick. Outcropping bedrock in the northern and eastern portions of the Bedford Subbasin is further evidence of the thin alluvial sediments.

Aquifer packages composed of various geologic units have been defined for this study based on depositional environment, degree of consolidation, groundwater production, and location throughout the Study Area. Three aquifer packages provide water supply to wells in Temescal Subbasin: the Channel Aquifer, the Alluvial Fan aquifers, and, to a lesser extent, consolidated sandstone aquifers. The thickness and geometry of these units were evaluated through the construction of hydrostratigraphic cross sections through the Study Area. The locations of five of the sections are shown on Figure 11. Three cross sections in Temescal Subbasin are provided on Figures 12 through 14 (A-A' through C-C') and two cross sections covering portions of Coldwater and Bedford subbasins (D-D' and E-E') are provided on Figure

15. Each of the aquifer units and the cross sections on which they are illustrated are described in more detail below.

3.3.1. Channel Aquifer

A package of relatively homogeneous and highly permeable sands approximately 200 feet thick have been encountered in many of the City wells in the northern half of Temescal Subbasin. This sand package is interpreted as channel deposits of an ancestral arm of the Santa Ana River and, as such, is referred to as the Channel Aquifer in this document. The alignment of the aquifer suggests that an ancestral river channel had entered the Temescal Subbasin at Arlington Gap, eroding the sedimentary units and possibly older alluvial fan deposits in the area. Permeable channel sands were deposited in the eroded channel over time. From the gap, the Channel Aquifer meanders northwest toward Prado Dam. The Channel Aquifer is limited in extent and is not present in the Coldwater or Bedford subbasins. The general extent of Channel Aquifer is shown by the dashed line on Figure 16, which also shows the distribution of hydraulic conductivity in various aquifer units.

The Channel Aquifer is illustrated on cross sections A-A', B-B', and C-C' on Figures 12, 13, and 14, respectively. Cross Section A-A' extends from the Santa Ana Mountains to the northeast across Temescal Wash to the bedrock high in the northeast. As shown on the section, the Channel Aquifer occurs in the northeastern portion of the subbasin and has a saturated thickness that ranges from 125 to 150 feet along this section. As illustrated on the section, Channel Aquifer sediments lie directly above granitic bedrock beneath Temescal Wash and above the Sandstone Aquifer in other areas (Figure 12).

Cross-section B-B' is located north of A-A' and extends from the Santa Ana Mountains through the Norco area (Figure 13). The Channel Aquifer is shown on the western side of the section southeast of the Prado Management Area. Similar to Cross Section A-A', the saturated thickness of the Channel Aquifer is about 100 to 150 feet thick. The cross section also shows the absence of the Channel Aquifer in the Norco area and illustrates the shallow depth to bedrock there (generally less than 100 feet). The saturated thickness of alluvial sediments in Norco is generally less than 50 feet. Also indicated on the section is a groundwater divide in the Norco area (near well 53-499) indicating possible groundwater outflow from the Norco area to the Santa Ana River (Figure 13).

The Channel Aquifer at Arlington Gap is shown on Cross Section C-C' (Figure 14). Here the saturated thickness is approximately 200 feet and well data indicate a thick and permeable sand package. The Channel Aquifer is underlain by the Sandstone Aquifer throughout most of this area.

Figure 16 shows estimated values of hydraulic conductivity (K) derived from test data on driller's logs and/or City well aquifer testing data. The K value is an indicator of the aquifer's permeability and is expressed in gallons per day per square foot (gpd/ft^2) or feet per day (ft/day). As shown in the figure, the wells within the limits of the Channel Aquifer have the highest hydraulic conductivity values in the Study Area (Figure 16). The lower K values shown within the extent of the Channel Aquifer area on Figure 16 are generally from deeper wells tapping the underlying Sandstone Aquifer. The average K value of City of Corona production wells screened solely in the Channel Aquifer (Wells 7A, 8A, 9A, 17, 25, and 28) is 2,062 gpd/ft^2 (276 ft/day).

3.3.2. Alluvial Fan Aquifers

Both older and recent alluvial fans have been deposited through time along the mountain front on the western edge of the subbasins. These fans have prograded across both Temescal and Coldwater subbasins from west to east (Figure 9). Although these deposits are relatively thick, the entire unit is heterogeneous and cannot be considered one single aquifer. Rather, sand lenses within the deposits collectively form the Alluvial Fan Aquifers. Lithologic data from wells are insufficient to map out the extent of the aquifers or characterize the deposits. Limited data indicate relatively fine-grained textures throughout much of the area, especially with depth.

The geometry of these units in the subsurface, including the contact with the Channel Aquifer, is illustrated on Cross Section A-A’ on Figure 12. The section illustrates the alluvial fan deposits that have infilled the basin. The fans have prograded across the basin and a thin veneer of these deposits likely overlies the Channel Aquifer at the surface (not shown on the section). Wells that penetrate the entire thickness of the Channel Aquifer in the east do not appear to encounter alluvial fan deposits on top of the Sandstone Aquifer. The total thickness of the deposits is unknown, but appears to exceed 1,400 feet in the central subbasin.

Only limited data exist for estimating K values in the alluvial fan deposits of Temescal Subbasin. Sparse data from a few wells indicate a K value of generally less than 50 gpd/ft^2 in the Alluvial Fan aquifers and in the Norco area (Figure 16). Specific capacity data from a City of Corona production well (Well 27), drilled in the Alluvial Fan, indicated a lower K value of about 7 ft/day (PBS&J, 2004).

Alluvial fan deposits in the Coldwater and Bedford subbasins are shown on Figure 15. The cross section on the left side of the figure shows the subbasin geometry and separation at the North Glen Ivy fault. The section on the right side is a north-south profile through the main portion of the Coldwater Subbasin where much of the subbasin production is located (Figure 11).

As shown on Figure 15, alluvial fan deposits in the Coldwater Subbasin range up to approximately 800 feet in thickness (consistent with the depth to bedrock map on Figure 10). Although the alluvial fan deposits here originate from the same mountain range as those in Temescal Subbasin, sediments have been eroded from different source rocks and have different textures and water quality. These alluvial fan aquifers are interpreted to be more permeable overall than the fan deposits in Temescal Subbasin and contain less mineralized groundwater.

However, aquifers are not as permeable as the Channel Aquifer in Temescal Subbasin. Hydraulic conductivity values for the Coldwater Alluvial Fan aquifers are generally less than 100 gpd/ft^2 (Figure 16).

3.3.3. Sandstone Aquifer

Some of the sedimentary units underlying the alluvial basin provide sufficient well yields to categorize them as aquifers. Although generally grouped with other bedrock units, the subsurface sedimentary rocks of Tertiary age in northeast Temescal Subbasin contain sandstone layers that are screened in several City wells (see Corona 24 on Figure 12). The estimated K value is 22 gpd/ft^2 (3 ft/day) for one City of Corona production well (Well 24) screened solely in the Sandstone Aquifer (below the Channel Aquifer). Due to the limited production, small areal extent, increasing depths, and relatively low permeability in most areas, the Sandstone Aquifer is not considered a primary source of water supply.

3.4. Water Supply

For more than 100 years, Study Area subbasins have been an important component of water supply. More than 650 wells have been drilled in the Study Area dating back to the early 1900s according to various DWR and Riverside County documents. Well uses include irrigation and domestic pumping, municipal wells, and shallow monitoring wells associated with commercial and industrial environmental investigations. A DWR study conducted in 1959 lists 112 wells in the Temescal, Coldwater, and Bedford subbasins, almost all of which were used as irrigation or domestic wells. Only limited data are available from the older wells and it is unknown if historical wells still exist. Riverside County files indicate that a large percentage of existing wells have been drilled as shallow monitoring wells in the Study Area, but files do not contain location or construction data for most of these wells, limiting their use for this study.

The City has operated as many as 31 municipal wells in the Study Area over time. Some of the older wells were purchased from the Temescal Water Company, a former irrigation water provider in the basin. Over the last few years, the City has obtained its groundwater supply from about 18 active wells. Most of the Temescal Subbasin wells are screened in the Channel Aquifer (generally shallower than 300 feet deep), but three wells also produce groundwater from the deeper Sandstone Aquifer. Three wells are located in the Coldwater Subbasin and produce groundwater from the local Alluvial Fan aquifers.

3.4.1. Pumping

A groundwater production database was developed from City records and data from a private firm, Water Master Support Services (WMSS). The WMSS data included production records from WMWD (including the City of Corona) and 56 other producers in the three subbasins from 1947 to 2004. Data are provided as annual totals, but monthly pumping totals were available for City wells from 1990 (with missing data in 1996). Total groundwater production by subbasin from 1947 to 2004 is shown on Figure 17. The location of pumping wells is shown on Figure 18.

As shown on the graph on Figure 17, groundwater pumping has varied over time and by subbasin. In the late 1940s, the total amount of groundwater pumping in the Study Area was about 20,000 AFY. That amount increased to between 25,000 AFY and 32,000 AFY from the late 1950s to the mid-1970s. Total groundwater pumping decreased to below 20,000 AFY in the 1980s and early 1990s due to a decrease in agricultural irrigation, but has increased to about 25,000 AFY in recent years due to municipal pumping. Most of the pumping occurred in Temescal Subbasin. Production in Coldwater Subbasin increased and accounted for more than one-half of Study Area production during a few years in the 1970s and 1980s, but has been less than 25 percent in recent years. Bedford Subbasin production is relatively minor and has decreased somewhat over time.

Most of the historical groundwater production (extending into the 1970s) was used for irrigation. During that time, groundwater supply was also supplemented with surface water and groundwater from adjacent basins conveyed by irrigation water companies. Data on sources and amounts of imports were generally unavailable, but some summary data were documented in an older DWR study (1947). After about 1980, agriculture lands had decreased significantly and almost all of the Study Area pumping was used for municipal supply.

Since 1980, the City has been the largest producer and currently pumps about 80 percent of all groundwater extracted from Study Area subbasins. The City also imports surface water from various sources to supplement the groundwater supply. The City has increased both groundwater production and imported supply over time, especially over the last 20 years, to meet increasing demands. The City's increase in groundwater and imported water supply is illustrated on Figure 19. As shown on the graph, the total water supply from 1964 to 1984 remained relatively consistent at an average of 10,138 AFY, with about 72 percent from groundwater (average 7,296 AFY) and 28 percent from imported water (2,842 AFY). From 1984 to 2004, groundwater pumping has averaged about 12,000 AFY, but has generally increased along with total supply. Since 2002, total water demand has been over 40,000 AFY, with groundwater production at about 20,000 AFY.

In addition to City pumping, approximately 56 other well owners have produced groundwater in the Study Area since 1947. The largest producers are listed on the following table.

Table 3-1
Major Groundwater Users
Data Review Period 1947-2004

Well Owner	Number of Wells	Last Year of Production	2004* Production (AFY)
City of Corona**	39	current	20,435
Ellsinore Valley Municipal Water District	19	current	2,344
Foothill Ranch	15	2000	0
Sunkist Growers Lemon Product	12	1980	0
City of Norco	6	current	1,856
Home Gardens County Water District	5	current	272
Henry Smith	5	1999	0
Cold Water Aggregates	3	current	360
Joy Water Company	3	2000	0

Source: WMSS Data 1947-2004
*Calendar Year
**Includes several inactive park irrigation wells and other non-municipal supply wells. As noted in subsequent sections and in Table 4-2, the City's production in 2007 was 22,317 AFY

3.4.1.1. Pumping in Temescal Subbasin

The graph on Figure 20 re-plots the pumping totals from Temescal and Coldwater Subbasins (from Figure 17) separately to examine pumping in each subbasin more closely. As shown on the graph, production exceeded 15,000 AFY in Temescal Subbasin from 1951 to 1978 in support of agriculture irrigation with peak production occurring from 1959 through 1964. Production declined generally to below 10,000 AFY by 1979 and averaged about 9,419 AFY over the next 17 years (1979-1996). During this time period, agriculture pumping had significantly declined, but municipal pumping had not yet increased. Since 2002, pumping has exceeded 20,000 AFY for the first time since the 1960s peak irrigation totals.

Almost all of this recent pumping is for municipal use. Industrial groundwater pumping is conducted by three companies in Temescal Subbasin (Minnesota Mining, Dart Container, and All American Asphalt) and accounts for about 700 AFY. There has been almost no agriculture pumping in Temescal Subbasin over the last few years.

3.4.1.2. Pumping in Coldwater Subbasin

As shown on Figure 20, groundwater production in Coldwater Subbasin has generally ranged from less than 3,000 AFY to more than 10,000 AFY. Since 1980, production has averaged 7,018 AFY.

There have been relatively few pumpers in Coldwater Subbasin over time. Most of the production has been by the City and EVMWD, the only municipal pumpers in the subbasin. Historically, City and EVMWD production has averaged 61 percent (3,538 AFY) and 31 percent (1,932 AFY), respectively, of the total subbasin production. Most of the production in the basin is exported for out-of-basin use.

Coldwater Aggregates extracts water to support sand and gravel mining and is the only industrial pumper in the subbasin. Their pumping amounts have ranged from about 100 AFY to 300 AFY, except for a period of increased production from 1975 through 1980 when production averaged about 450 AFY.

A few well owners have also produced small amounts of groundwater to support agriculture and domestic use. Until the last few years, agriculture pumping was relatively consistent, averaging about 200 AFY since 1947. However, there has been no agriculture pumping recorded in Coldwater Subbasin since 2001. Agriculture pumping occurred mainly in the foothills along the western edge of the subbasin. Municipal and industrial pumping is clustered along the basin-bounding fault on the eastern side of the subbasin (Figure 18).

3.4.1.3. Pumping in Bedford Subbasin

As shown on Figure 17, production from Bedford Subbasin has been less than in Temescal or Coldwater subbasins. Since 1947, Bedford production has ranged from 373 AFY to 4,658 AFY and has declined slightly over time with decreasing agriculture land use. Several pumping wells exist at the mouth of Bedford Canyon, just north of the subbasin boundary (Figure 18). These wells are just outside of the Temescal subbasin boundary and are included in Bedford Subbasin pumping for convenience.

Most of the early production in Bedford Subbasin supplied irrigation on local ranches. In the late 1940s, agricultural pumping represented more than 70 percent of the total subbasin pumping. Since 1984, irrigation pumping has accounted for less than 20 percent (average 421 AFY) of total production. EVMWD has been the largest single pumper over the last 20 years, producing about two-thirds of the water extracted from the subbasin (or just outside the subbasin boundary, at Bedford Canyon on Figure 18). The City has also produced small quantities of groundwater in that area (abandoned City Well 4 east of Bedford Canyon). Historically, production associated with Bedford Subbasin by the City and EVMWD has averaged 194 AFY and 1,200 AFY, respectively. Almost all of the municipal production occurs just outside of the northern edge of the subbasin at Bedford Canyon (Figure 18).

3.4.2. Imported Water

The City imports water through WMWD, a member agency of the Metropolitan Water District of Southern California (Metropolitan). Water is supplied from both the Colorado River and the State Water Project (SWP). Figure 19 shows the annual amount of water imported over time. From 1964 to 2004, water demand has increased by a factor of four and imported water has been an increasingly important component of the City's water supply. Since 2000, an average of 23,126 AFY has been imported, accounting for more than one-half of the City's total water supply. Additional information on the City's water supply is provided in Chapter 4.

LLWD also imports water from WMWD for potable supply in Bedford and Coldwater subbasins. In 2004, LLWD provided 1,174 AFY of imported supply to local residential customers.

3.4.3. Wastewater

For more than 40 years, industrial and municipal wastewater discharge has occurred in the northern portion of the Temescal Subbasin. Prior to 1963, Sunkist Growers was discharging about 790 AFY of wastewater to land along Temescal Wash in the northern portion of the subbasin (DWR, 1965), a discharge that apparently continued into the 1970s. Since the 1950s, the City has been discharging municipal wastewater effluent into ponds along the wash or directly into Temescal Wash in compliance with their wastewater discharge permits (RWQCB December 19, 2001; September 26, 2001; April 17, 1998a). From 1955 to 1963, discharges averaged about 1,000 AFY (DWR, 1965).

The City operates three wastewater treatment plants (WWTPs), two of which provide recharge to groundwater in the Temescal Subbasin. WWTP No.1 and No. 2 are located in the northern portion of the subbasin. Prior to 1997, all of the wastewater effluent was discharged to one or more of 13 percolation ponds, 10 of which were at the western end of Rincon Street in the vicinity of the Corona Airport and three of which are located along Temescal Creek between Lincoln Avenue and Cota Street. Discharge to the ponds near the Airport have been discontinued and only the three ponds referred to as the Lincoln, Cota North, and Cota South ponds are currently in use for discharge percolation (Figure 7). After 1997, WWTP No. 1 also discharged a portion of the wastewater into Temescal Wash. Beginning in 2002, the City began recycling a portion of the tertiary treated wastewater from WWTP No. 1 for landscape irrigation, reducing the overall discharge. WWTP No. 3 is located at the southeastern corner of Temescal Subbasin and provides recycled water for irrigation. The plant also discharges a small amount of tertiary treated effluent into Temescal Wash when effluent exceeds the irrigation demand.

Detailed data on wastewater volumes discharged to Temescal Wash and Lincoln and Cota ponds were available only dating back to 1997. According to City personnel, earlier records are no longer available. Files at RWQCB only date back to 1993, and efforts to recover historical RWQCB file archives were unsuccessful. As such, historical amounts of discharge to the groundwater basin were estimated using a factor of wastewater generation per household as described below.

Population data, provided in five-year increments in the City's Water Master Plan (AKM, April 2005), were evaluated on an annual basis from 1984 using a linear extrapolation. An average household was assumed to be 3.3 persons. Based on current wastewater generation, a factor of 270 gallons per day (gpd) per household was used (AKM, September 2005). This method was applied to years where actual data existed to evaluate the accuracy of the methodology. The difference between estimated and actual total wastewater generation during those years was less than three percent, verifying the method for predicting total wastewater from 1984 through 1996. Operational information provided by the City indicated that all wastewater generated before 1997 was discharge to percolation ponds only. The decline from 1996 to 1997 reflects the beginning of discharge to Temescal Wash.

Using this methodology for historical estimates and recent City data, the amount of wastewater discharged to the ponds was graphed from 1984 to 2004 as shown on Figure 21. Over this time period, wastewater discharge to the ponds averaged 6,574 AFY.

3.5. Groundwater

Groundwater occurs under unconfined conditions in the unconsolidated sediments of the subbasins including the Channel Aquifer and Alluvial Fan Aquifers. Water level data from the underlying consolidated sedimentary units are limited, but groundwater is likely more confined in the deeper units. Water levels and groundwater flow in the subbasins are described in the following sections.

3.5.1. Water Levels

Groundwater data dating back to 1916 were compiled into a water level database from multiple sources, including DWR, SAWPA, USGS, Riverside County, and the City. At least five water level measurements in the Study Area were available for each year since 1924 with one or two measurements in 1916, 1919, and 1922. Hydrographs were generated for most of the wells containing five or more measurements to examine water level trends and fluctuations throughout the basin. Three key hydrographs were selected to represent long term water levels in each subbasin. Locations of the three wells used to construct the key hydrographs are shown on Figure 22 and hydrographs are presented on Figures 23, 24, and 25. A discussion of water level trends and fluctuations in each subbasin is provided below.

3.5.1.1. Water Levels in Temescal Subbasin

Water level changes in the Temescal Subbasin from 1953 to 2004 are shown on the long-term hydrograph on Figure 23. The graph shows the time period 1947 through 2004 for easy comparison to the pumping graph on Figure 20. The hydrograph combines water level data recorded during both pumping and static conditions in City Well No. 8, resulting in the somewhat spiking nature of the data, especially since 1987. Recent data from the City identified levels recorded during or immediately after pumping, but most of the data were not so designated. Filtering out designated pumping water levels removed data that appeared consistent with static conditions and left many data points remaining that appeared to be lower than static water levels. As such, all levels are shown on Figure 23 to preserve the overall trend.

Since 1953, water levels have fluctuated a total of about 45 feet, from an elevation of 580 feet msl to about 535 feet msl (assuming the spikes below that level are influenced by local drawdown in the pumping well). In general, water levels correlate to wet and dry hydrologic cycles as shown by annual precipitation on Figure 5. The highest water levels were measured in the early 1980s in response to a wet hydrologic cycle that began in 1978. These higher levels also correlate to a period of relatively low pumping in the subbasin (Figure 20). During a later wet cycle from 1992 to 1998, water levels did not recover to 1980s levels, likely due in part to an increase in subbasin pumping (Figure 20).

Current levels appear to be near record lows with levels falling below 540 feet msl over the last few years. With precipitation data indicating near-average conditions in the basin, the declining water levels may be indicative of over-pumping conditions in the subbasin.

3.5.1.2. Water Levels in Coldwater Subbasin

Water levels in the Coldwater Subbasin are illustrated by the hydrograph from City Well No. 3 on Figure 24. As shown on the graph, water levels have fluctuated dramatically over the last 40 years in response to wet and dry cycles in the basin. In contrast to the 45-foot water level fluctuations noted in Temescal Subbasin, water levels in Coldwater Subbasin have varied more than 300 feet over approximately the same time period. The highest water level was recorded during 1983 at an elevation of 1,112 feet msl within 20 feet of the ground surface. During 2004, water levels fell below 800 feet msl for the first time in at least 40 years, possibly representing an all-time low water level for the subbasin.

The wide water level fluctuations over time in Coldwater Subbasin reflect the relatively small footprint and compartmentalization of the subbasin (Figure 21). The basin covers only about 2,000 acres and is surrounded on the west, north, and south by bedrock. In addition, communication with the adjacent Bedford Subbasin is impeded by the North Glen Ivy fault (associated with the Elsinore-Chino fault zone). Although the subbasin is capable of receiving large amounts of recharge from mountain runoff, it has a relatively limited storage capacity. However, it is unknown whether the recent steep decline in City Well No. 3 is reflective of water level conditions on a subbasin basis. Water level data are mainly available only in or near active pumping wells in the subbasin.

3.5.1.3. Water Levels in Bedford Subbasin

An analysis of groundwater conditions in Bedford Subbasin was conducted in support of a recycled water feasibility study conducted for LLWD and provided in Appendix D. This analysis incorporates and builds on data presented in the main portion of the GWMP. The recharge project is a groundwater management strategy for potentially increasing subbasin yield.

As described in detail in Appendix D, very few wells in the Bedford Subbasin contain a sufficient water level record to analyze long term trends. However several wells near the northeast outflow of the subbasin allow for an analysis of water levels at that location (Figure 22). One well, City No. 4, is located about 950 feet north of the northeast corner of Bedford Subbasin at the mouth of Bedford Canyon. Wells pumping in this area receive recharge from runoff in adjacent Bedford Canyon (Temescal Subbasin) as well as surface and subsurface outflow from Bedford Subbasin. The location is also downgradient from any subsurface outflow that occurs from Coldwater Subbasin (Figure 22). As such, water levels in this area are indicative of the total groundwater and surface water discharge where Temescal Wash temporarily leaves the subbasins. A hydrograph from this Bedford Canyon well is shown on Figure 25.

As shown on the hydrograph, water levels have fluctuated only about 60 feet over the last 40 years. The hydrograph is plotted at the same scale as the Coldwater Subbasin hydrograph (Figure 23) for comparison to the 300 feet of change seen just south of this well. In the Bedford Canyon well, water levels have been recorded as high as 782 feet, but have remained above about 770 feet for most of the period of record. Water levels dropped to around 720 feet during the relatively dry cycle from 1987 to 1995.

The ground surface elevation at this well is reported to be about 791 feet msl (Figure 24) indicating that water levels are within 10 feet of the ground surface during times of high water levels. Downstream ground surface elevations are around 780 feet, similar to water levels in the well. These surface elevations indicate the level at which the groundwater basin is likely discharging to Temescal Wash as the Wash leaves the subbasins and traverses north across consolidated sediments in Temescal Canyon. Production wells in this area are expected to reduce surface flows in Temescal Wash, but do not appear to have significantly impacted groundwater in any of the subbasins.

3.5.2. Groundwater Flow Directions

Groundwater flow in the Study Area is generally from the surrounding uplands toward Temescal Wash and then north and northwestward toward the groundwater and surface water discharge location at Prado Dam.

Only a few water level contour maps exist in available documents and none of them covers the entire area of the subbasins. As such, water level data were plotted for various time periods to analyze groundwater flow directions over time. Water level contour maps are presented on Figures 26 and 27 for representative periods of low water levels and high water levels in the basin, respectively. These maps are discussed in more detail below.

3.5.2.1. Groundwater Flow – Spring 1964

Figure 26 shows a water level contour map based on water levels from Spring 1964 and represents a time period when water levels were at relatively low levels in each of the subbasins as indicated on the key hydrographs (Figures 23, 24, and 25). Very few data points were available in Bedford or Coldwater subbasins during this time period, and water levels there are highly interpretive. In addition, almost no water level data are available in the alluvial fan deposits in southwestern Temescal Subbasin, so contours have been interpreted to mirror topography.

In the Bedford Subbasin, groundwater flows northward in the thin alluvial sediments. Given the narrow alluvial constriction at the southern corner of the subbasin, there is unlikely to be significant subsurface inflow of groundwater into the Study Area from the south. Almost no water level data are available from the central portion of the subbasin and contours were interpreted using geology and ground surface elevations.

Groundwater in Coldwater Subbasin flows from recharge areas in the west toward the North Glen Ivy fault that separates Coldwater and Bedford subbasins. Outflow does not likely occur during times of low water levels when significant differences in water levels are noted across the fault. When groundwater outflow does occur from Coldwater Subbasin, flow likely follows subsurface channels beneath the surface water drainageways at the central portion of the subbasin boundary. Dissected outcrops of older, semi-consolidated deposits indicate a few pathways of incised surface water drainages emanating from Coldwater Subbasin and crossing Bedford Subbasin in this area. Once in Bedford Subbasin, both groundwater and surface water flow continue northward to the subbasin boundary where flow converges with groundwater flow out of Bedford Canyon. Here water levels rise and partially discharge to Temescal Wash as it enters Temescal Canyon.

An area of uncertainty is in southeastern Temescal Subbasin north of Bedford Canyon where a groundwater divide may be present. Highly dissected alluvial fan deposits and bedrock outcrops of various Miocene-age formations indicate complex geology and thin alluvial deposits north of Bedford Canyon (Figures 9 and 10). A groundwater divide is interpreted in this area, defined by northerly flow north of the divide and northeasterly flow in Bedford Canyon south of the divide.

In the southwestern portions of the Temescal Subbasin, groundwater flows northeast in alluvial fan deposits toward the area of the Channel Aquifer. Groundwater then flows northwesterly toward the subbasin outflow at the Prado Management Area. Groundwater rises and leaves the basin as surface water discharge at Prado Dam.

3.5.2.2. Groundwater Flow - Spring 1984

Groundwater elevation contours estimated for conditions in Spring 1984 are shown on Figure 27. Spring 1984 represents the end of an extended wet hydrologic cycle and water levels are at relatively high water levels throughout the Study Area. In general water levels in northern Temescal Subbasin are about 25 to 40 feet higher than in 1964. In Coldwater Subbasin, water levels are almost 200 feet higher than in 1964. In Bedford Subbasin, water levels appear to be similar to 1964, constrained somewhat by the ground surface elevations. Groundwater discharge to Temescal Wash is likely occurring in northern Bedford Subbasin during times of high water levels. Groundwater flow directions are generally similar to those in 1964. However, outflow from Coldwater Subbasin is likely occurring in 1984, adding recharge to the Bedford Subbasin.

3.5.3. Groundwater Quality

Groundwater quality data for this study were sourced from SAWPA, the California DPH Drinking Water Program (DHS DDWEM, July 2006), and the City of Corona. Data were combined into a comprehensive database and used to identify the chemical signature of groundwater and concentrations of constituents of concern within the Study Area.

3.5.3.1. Inorganic Groundwater Chemistry

Inorganic water quality data from 102 wells in the Temescal, Bedford, and Coldwater subbasins were used to evaluate the general groundwater chemistry across the Study Area. Well locations are shown on Figure 28 and are color-coded by general areas of similar water quality. The water quality in these areas may be impacted by inflows from different source areas based on the hydrogeologic analysis of the Study Area. These areas are summarized on the following table.

Table 3-2
Groundwater Areas for Water Quality Assessment

Subbasin	Groundwater Areas	Number of Wells
Temescal	Southwestern Alluvial Fan	6
	Arlington Gap	15
	Norco Area	16
	Upgradient (southeast) of Norco	16
	Downgradient (southwest) of Norco	33
	Temescal Wash - Bedford Canyon	5
Coldwater	Coldwater Subbasin	10
Bedford	Bedford Subbasin	1

To characterize groundwater quality in these various areas, water quality data were evaluated using a geochemical plotting technique known as a Trilinear Diagram (Piper, 1944). This technique plots the major anions and cations in percent milliequivalents per liter (% meq/L) to characterize inorganic water chemistry and differentiate samples of varying water quality. Cations in % meq/L are plotted on the lower left triangle and anions in % meq/L are plotted in the lower right triangle. Data are projected onto the central diamond to evaluate overall water type.

Water samples of similar quality plot together in a cluster. Water samples that are a mix of two different source waters plot between the two source type end members.

Figures 28 and 29 show trilinear diagrams of the groundwater chemical signatures in Coldwater and Temescal subbasins, respectively. Only the most recent reported groundwater quality data for each well are plotted. This methodology combines data from 1953 to 2005, but a comparison of historical and recent data indicates no significant changes in inorganic water chemistry over time.

Overall, most of the water quality data indicate similar inorganic chemistry. As shown on the figures, data points for most of the wells generally cluster in the central portion of the diamond (shaded areas on the plots on Figures 28 and 29), indicating primarily a sodium/calcium-bicarbonate water type. However, variability of water types can be correlated to specific areas and indicate the following relationships:

- Groundwater in the Coldwater Basin (Figure 28) has a relatively high calcium-to-sodium ratio compared to groundwater in Temescal Subbasin (with the exception of groundwater in the western alluvial fan). This relationship is likely caused by the chemical interaction of rainfall and outcropping granitic bedrock (and the lack of outcropping volcanic bedrock) in the Coldwater Basin watershed.
- Groundwater in wells located in the Bedford Canyon portion of Temescal Wash or Temescal Canyon (Figure 28) has a higher ratio of calcium-to-sodium and sulfate-to-chloride than wells located in Arlington Gap. Relative cation concentrations indicate that groundwater in the Temescal Wash area upgradient of the Norco area is a mixture of waters from both the Temescal Canyon area and Arlington Gap, but are most similar to the water in Arlington Gap.
- Groundwater in wells located in the Norco area has a lower ratio of calcium-to-sodium and sulfate/bicarbonate-to-chloride than most other areas.
- Groundwater in wells located in the southwestern alluvial fan has the highest ratio of calcium-to-sodium and sulfate-to-chloride/bicarbonate compared to groundwater in other areas. The water type in the alluvial fan may result from geochemical interaction between rainfall runoff and the outcropping Santiago Peak volcanics in the western catchment area of Temescal Subbasin prior to aquifer recharge along the base of the mountains.
- Cation concentrations indicate that groundwater in wells located in Temescal Wash downgradient of the Norco area appear to be mixtures of groundwater from three sources: Temescal Wash upgradient of the Norco area, Arlington Gap, and the western alluvial fan.

This water quality source assessment indicates the major sources of water by analyzing the blending of different water quality from different areas. Identifying major areas of inflow and outflow is critical in developing a strong conceptual model of the aquifer. Based on water quality type, the groundwater in the Channel Aquifer appears to be derived mainly from Arlington Gap and to lesser extent Temescal Wash. In addition to these sources, the western Channel Aquifer also receives inflow from the Alluvial Fan.

3.5.3.2. Total Dissolved Solids (TDS) Concentrations in Groundwater

Groundwater in the Study Area tends to be highly mineralized. Figure 30 shows the range of total dissolved solids (TDS) concentrations across the Study Area. Data represent the most recent concentration of TDS from 89 wells. The map indicates that groundwater in the Temescal Subbasin generally exceeds the secondary maximum contaminant level (MCL) of 500 mg/L for drinking water. TDS concentrations greater than 1,000 mg/L are observed beneath Temescal Wash and in the Norco area. Groundwater in the Norco area is also characterized by elevated hardness.

TDS concentrations in the Coldwater and Bedford subbasins are generally lower in TDS and range from 300 to 650 mg/L. Average TDS concentrations for each subbasin are summarized below.

Table 3-3
Total Dissolved Solids in Groundwater

Subbasin	Number of Wells	TDS (mg/L)	
		Range	Geometric Mean
Temescal	80	307 - 1,950	894
Bedford	1	630	630
Coldwater	8	300 - 650	477

3.5.3.3. Nitrate Concentrations in Groundwater

Elevated nitrate concentrations have been documented in the Temescal Subbasin since at least the 1950s. The latest reported nitrate concentrations (as NO_3) for 78 wells in the Study Area are shown on Figure 31. Water quality data indicate nitrate concentrations ranging from 0.3 to 124 mg/L. Although the average nitrate concentration in the subbasin is 41 mg/L, nitrate concentrations in 28 of the 72 subbasin wells do not meet the primary MCL standard of 45 mg/L for drinking water. The highest nitrate concentrations are those associated with wells at the Arlington Gap where concentrations of groundwater entering Temescal Subbasin exceed 100 mg/L. Elevated nitrate concentrations are also generally located along Temescal Wash and on the western alluvial fan.

Groundwater quality in City wells typically does not meet federal or state drinking water standards for nitrate (45 mg/L). Nitrate concentrations (as NO_3) measured in the City production wells typically range from 4.0 to 110 mg/L. Most wells require treatment and/or blending to meet regulatory requirements.

In the Coldwater Subbasin, groundwater nitrate concentrations (as NO_3) for six water supply wells range from 0.4 to 6.5 mg/L, significantly below the MCL. Although data were generally unavailable for the Bedford Subbasin, DWR reports historical elevated nitrate and sulfate concentrations in the area (DWR, 1959). However, one recent sample (2007) from a Bedford Subbasin well indicated a relatively low nitrate (as N) concentration of 1.2 mg/L (LLWD, 2007).

3.5.3.4. Additional Water Quality Concerns

As urbanization has increased in the Study Area, the potential for groundwater quality impacts from anthropogenic (human-influenced) sources has also increased. Numerous underground storage tanks (USTs), dry cleaners, and industrial facilities are located across the subbasins and in adjacent basins. Potential impacts from historical anthropogenic sources are also a concern. For example, years of wastewater discharge by citrus processing facilities occurred in areas where locally elevated chloride concentrations have been detected. In addition, the U.S. Navy operated an ordnance laboratory in the Norco area in 1957 (DWR, 1959). Data were compiled from regulatory agencies in the Study Area to identify areas of concern.

Regulated Facilities

Potential threats to groundwater quality are regulated by RWQCB, Department of Toxic Substance Control (DTSC), and the Riverside County Department of Environmental Health (DEH). A review of the RWQCB database identified 30 major sites that are regulated for possible environmental releases in the Corona area and approximately 75 Underground Storage Tank (UST) investigations. These sites are shown on Figure 32. Regulated facilities and USTs that overlie the areal extent of the Channel Aquifer are of highest concern, given the permeable nature, shallow depth, and the reliance on the aquifer for water supply.

Corona Sanitary Landfill

One regulated facility, the Corona Sanitary Landfill, has impacted local groundwater quality and remains a potential threat to existing city wells and the Channel Aquifer. Riverside County Waste Management Department (RCWMD) operates the closed sanitary landfill on an 80-acre site identified on Figure 32. Groundwater impacted by trichloroethene (TCE) has been mapped offsite and downgradient of the landfill. The TCE plume, as interpreted in a 1999 study, indicates that elevated TCE concentrations are migrating toward City wells (RCWMD, 1999). The study also concludes that more than one source of TCE exists in the area.

Three City wells downgradient of the landfill plume have already detected low concentrations of TCE in micrograms per liter (ug/L) as summarized in the following table. One additional nearby well not has not yet detected TCE, but does not appear to be directly downgradient from the TCE-impacted groundwater.

Table 3-4
TCE Detections in City Well Samples
Data Review Period 1999-2002

City Well	Number of Detections	Highest TCE Concentration
Well 6	7	1.0 ug/L
Well 7	12	2.2 ug/L
Well 17	10	2.4 ug/L

Although none of the detections have exceeded the MCL of 5 ug/L, the occurrence of TCE at the wells indicates a continuing threat to water quality. Strategies developed for this GWMP consider options to address specific water quality concerns.

3.6. Water Balance

Preliminary water balances have been prepared for the two subbasins that provide City water supply, Temescal and Coldwater, to evaluate current conditions and future sustainability of the groundwater resource. Data are generally inadequate for a rigorous assessment, and many simplifying assumptions have been made; nonetheless, the water balances presented here provide useful information for basin management and address the sustainability of the groundwater resource.

Data gaps and uncertainties associated with the Bedford Subbasin limit the ability to quantify inflows and outflows. In addition, Bedford Subbasin is relatively shallow, characterized by thin alluvial sediments and relatively high water levels with very little water use. Only one groundwater management strategy was identified with the Bedford Subbasin (groundwater recharge by LLWD) and that strategy was analyzed based on water level data and did not require a detailed water balance. Further analysis of the Bedford Subbasin in a feasibility study of the LLWD management strategy is provided in this document as Appendix D.

The water balances for Temescal and Coldwater subbasins are useful beyond application to GWMP management strategies. The evaluation provides a tool to improve the understanding of the groundwater system and to refine the conceptual model. It also supports improved monitoring in the basin, identifying where additional data would be most useful. The water balance will continue to be refined and updated in the future as additional data become available. In addition, the water balance provided a foundation of the development of the numerical model used to assess some management scenarios.

The water balance relies on data presented in the previous sections of the GWMP. Groundwater subbasin conditions and analyses are not repeated in this section, but previous figures are referenced where applicable. A more complete explanation of each figure is contained in the section where each was first introduced.

3.6.1. Approach

The water balance for Study Area subbasins examines inflow into the subbasins, outflow from the basins, and change in groundwater storage in the basin, recognizing the following relationship:

Inflows – Outflows = Change in Storage

To examine how these components change through time with varying amounts of recharge and pumping, the balance was conducted over a 15-year period, 1990 through 2004, covering a full hydrologic cycle of wet and dry conditions as well as significant changes in groundwater pumping. Change in groundwater storage over that time period was estimated independently using water level data, and compared to the net difference between estimated inflows and outflows to check for inconsistencies and to identify simplifying assumptions or data gaps of concern. For the Temescal Subbasin, the balance was further evaluated with the construction and calibration of a numerical groundwater model. These steps allow for a reasonable range of values to be determined for each element of the water balance and highlight the sensitivity of the water balance to specific elements.

To evaluate water balance components, the contributing watersheds and subbasins were subdivided and designated as water balance units to assist in the analysis. These units are shown on Figure 33 and allow for grouping areas together of similar land use, soil type, and/or other water balance factors within each unit. The delineation of similar areas within the water balance units are referred to in this document as water balance elements. These elements are shown on Figure 34 and represent areas of similar land use, soil type and precipitation zones.

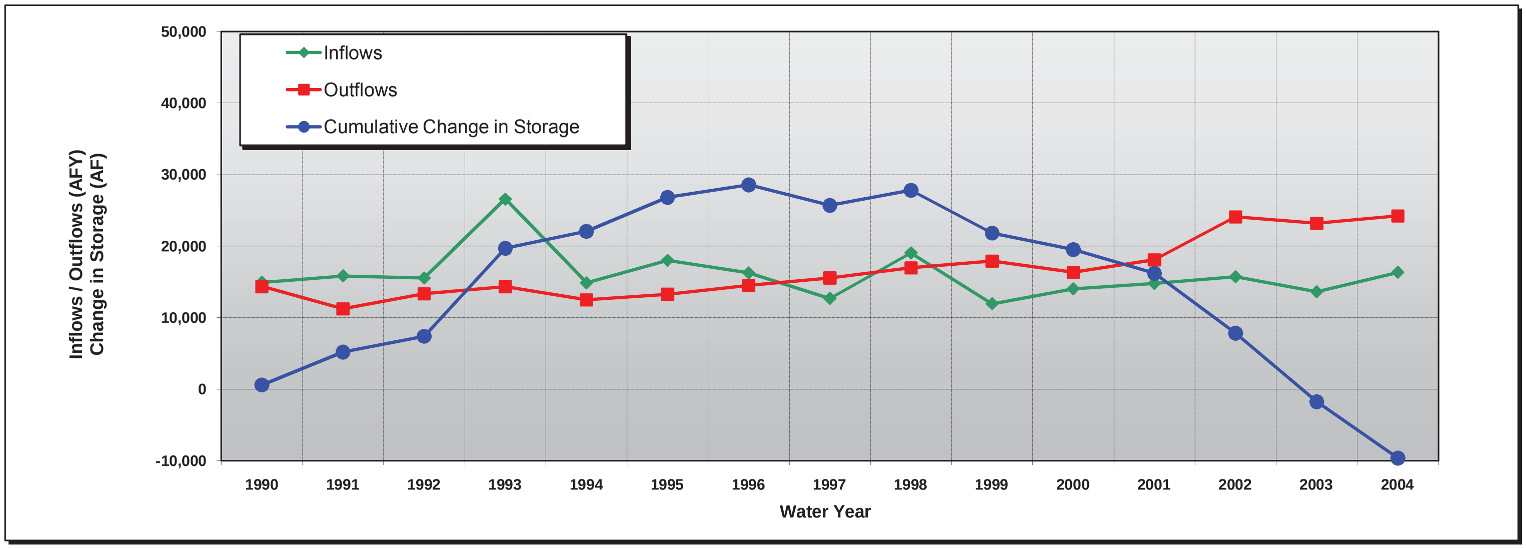
Throughout this report, areas are shown to the nearest acre, and water budget items are shown to the nearest AF. As a result, large numbers may appear to be accurate to four or five significant digits, which is not the case. Values for data that are measured directly, such as water levels, streamflow, and groundwater pumping, are probably accurate to two or possibly three significant digits. Values for data that are estimated, such groundwater storage changes and groundwater inflows and outflows, are probably accurate to only one or two significant digits. All digits are retained in the text and tables to preserve correct column totals in tables and to maintain as much accuracy as possible when converting units or conducting subsequent calculations.

3.6.2. Temescal Subbasin Water Balance

The water balance for the Temescal Subbasin was initially conducted through an independent evaluation of the different components of inflow and outflow from the subbasin. The resultant change in storage was checked for reasonableness by estimating the change in storage indicated by water level fluctuations over the Study Period. These inflows and outflows were then incorporated into a numerical groundwater model based on the hydrogeologic conceptual model of the basin. Inflows and outflows were adjusted during calibration to provide a better fit to measured water levels in key areas of the basin. The methodology for each of these steps is summarized in the following sections. Table 3-5 summarizes the water balance results as modified through groundwater model calibration. Documentation of the development of the groundwater model is provided in Appendix C.

Table 3-5
Water Balance Summary for Temescal Subbasin

Water Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	653	1,122	12,694	0	1,766	0	0	3,753	0	0	1,714	3,076	608	913	**1,753**
Infiltration of Runoff in Detention Basins	478	478	482	478	478	478	482	478	478	478	482	478	478	478	482	**479**
Recharge from Wastewater Discharge	6,978	7,380	7,797	8,214	8,629	9,056	9,474	5,238	7,812	3,650	6,104	6,072	6,289	5,994	7,997	**7,112**
Subsurface Inflow Subtotal	5,602	5,828	4,603	3,643	3,983	4,945	5,407	4,717	4,806	5,097	4,695	4,068	3,173	3,778	4,186	**4,569**
- Arlington Gap	4,654	4,880	3,652	2,695	3,035	3,997	4,456	3,769	3,858	4,149	3,745	3,120	2,225	2,830	3,235	3,620
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	783	783	785	783	783	783	785	783	783	783	785	783	783	783	785	783
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	1,897	1,506	1,545	1,575	1,780	1,790	902	2,262	2,207	2,716	2,749	2,455	2,712	2,760	2,760	**2,108**
TOTAL INFLOWS (AFY)	**14,956**	**15,844**	**15,549**	**26,605**	**14,871**	**18,035**	**16,264**	**12,696**	**19,057**	**11,940**	**14,030**	**14,788**	**15,728**	**13,618**	**16,338**	**16,021**
OUTFLOWS																
Groundwater Pumping	10,248	7,294	9,378	10,302	8,465	9,233	10,470	11,492	12,889	13,847	12,251	13,981	19,986	19,073	20,112	**12,601**
Subsurface Outflow to Santa Ana River	4,104	3,944	3,973	4,019	4,028	4,040	4,050	4,061	4,074	4,074	4,096	4,102	4,123	4,121	4,114	**4,062**
TOTAL OUTFLOWS (AFY)	**14,352**	**11,238**	**13,351**	**14,321**	**12,494**	**13,273**	**14,520**	**15,553**	**16,963**	**17,920**	**16,347**	**18,082**	**24,109**	**23,194**	**24,227**	**16,663**
Cumulative Change in Storage (AF)	**604**	**5,210**	**7,408**	**19,692**	**22,069**	**26,831**	**28,575**	**25,718**	**27,812**	**21,832**	**19,514**	**16,220**	**7,839**	**-1,737**	**-9,627**	



3.6.2.1. Inflows to Temescal Subbasin

Inflows to the Temescal Subbasins include the following:

- deep percolation from rainfall on the basin floor
- return flows from urban and agriculture irrigation
- infiltration of runoff from surrounding uplands
- stormwater infiltration at flood control basins
- discharge at wastewater recharge ponds
- subsurface inflow from adjacent subbasins.

Each inflow component is estimated on an annual basis over the Study Period from 1990 through 2004. Methodology, assumptions, and results are discussed below.

Deep Percolation from Precipitation

Deep percolation from precipitation is the amount of precipitation (rainfall) that falls on the floor of the groundwater basin and infiltrates through the soil to the underlying water table. The volume of deep percolation is influenced by factors including the amount and timing of precipitation, soil type, geology, topography, vegetation cover, and extent of impervious areas (e.g., pavement and buildings). In the Study Area, deep percolation is limited due to the large impervious area of urban development that covers the basin floor, especially over the productive Channel Aquifer. In this area, a large portion of rainfall is funneled to lined storm drains and prevented from recharging groundwater. Nonetheless, deep percolation represents a significant portion of the subbasin inflow in wet years. It contributes almost no inflow in dry years.

Deep percolation was calculated over the Study Area using two steps: a runoff analysis and a soil moisture balance. The runoff analysis used the SCS Curve Number method to estimate the amount of precipitation resulting in runoff based on land use type, soil type, and precipitation amount. The soil moisture balance examines the precipitation that does not result in runoff and determines the amount available for groundwater recharge.

To account for the factors that vary spatially, the Study Area was divided into unique elements. This was accomplished by overlaying spatial maps to create elements each with a single soil hydrologic classification, soil moisture capacity value, precipitation multiplier, and land use category. Because the land use changes over time, a set of elements was created for each year that a land use map was available (i.e., even years from 1984 - 2004). For each year without a land use map (odd years), it was assumed that the land use remained the same as the previous year. The elements created for 2004 are shown on Figure 34.

For each element, the runoff analysis and soil moisture balance were applied to estimate deep percolation. Elements within the groundwater basin are applicable to deep percolation, while elements in the contributing watershed were analyzed as part of the evaluations of infiltration of runoff and subsurface inflow, respectively, which are addressed in subsequent sections.

Runoff Analysis

The Curve Number runoff analysis was developed by the SCS (Soil Conservation Service, now the U. S. Natural Resources Conservation Service, NRCS). The method is described in the document *Technical Release 55* from the U.S. Department of Agriculture (USDA, 1986). Direct runoff is calculated as a relationship between *rainfall*, the potential maximum *initial abstractions* and the *retention* after runoff begins.

Rainfall was estimated for each element and each month using historical rainfall data from the Elsinore station and the PRISM isohyetal map (see Figure 6). For watershed areas with substantially higher rainfall than Elsinore, monthly rainfall amounts were estimated by applying a rainfall-elevation factor based primarily on the PRISM map. Land use also was considered. Information on land use types and the portion of impervious area by housing type (provided in the Riverside County Flood Control and Water Conservation District Hydrology Manual) were used to derive a weighted average percent impervious area, 56 percent, which was used for all urban types. All precipitation falling on these impervious areas was assumed to become runoff that was captured by storm water collection systems (and removed from the water balance).

Initial abstractions include water that is captured before runoff. This initial abstraction includes plant interception, initial infiltration, and surface storage associated with ground cover and can be expressed as a percentage of the maximum retention. For the purposes of this study, initial abstractions were assumed to be 20 percent of the maximum retention, the recommended default value from the NRCS.

The *potential maximum retention* is estimated using a coefficient, or curve number. The curve number is based on information on land use and soil hydrologic classification, obtained primarily from the Hydrology Manual. The manual provides maps showing soil hydrologic groups (e.g., Group A – high infiltration through Group D – very slow infiltration) and provides the curve numbers for specific land use types and soil hydrologic groups. For this analysis, curves representing moderate runoff potential were used to calculate direct runoff on a monthly basis. These runoff values then were subtracted from actual precipitation to derive the *effective precipitation.* The effective precipitation is assumed available to meet ET demands, to contribute to soil water capacity, and to provide deep percolation to groundwater.

Soil Moisture Balance

Once the effective precipitation was calculated in the Curve Number analysis, it was input to the soil moisture balance. The soil moisture balance accounts for soil moisture storage and provides an estimate of ET; the remaining water is assumed to recharge the aquifer as deep percolation.

Soil moisture holding capacity values were derived using the Riverside County and Orange County soil surveys performed by the NRCS (2006). Soil moisture capacity for each soil type was derived from the weighted average of the moisture capacity over the entire rooting depth. The soil types then were divided into four categories based on soil moisture holding capacity: low, medium, high, and very high capacity. These categories were overlain with the soil hydrologic groups (A through D). Figure 35 shows the distribution of the resulting soil types; soils without soil moisture holding capacity data (unknown-UNK or not available-NA) are indicated.

The soil moisture balance was applied to each element to evaluate deep percolation. In brief, the soil moisture balance computes deep percolation on a monthly time step as the residual of the equation:

Effective precipitation - ET - soil moisture storage = deep percolation.

The rate of percolation was then applied to each area to calculate the total volume of recharge from deep percolation. This analysis resulted in a range of recharge estimates from less than one AFY of recharge in years of very low precipitation such as 1999 and 2002 to almost 10,000 AFY in 1993, the wettest year of the Study Period. These numbers were adjusted upward slightly (about 2 percent) in the groundwater model during model calibration as documented in Appendix C. Final recharge values for the purposes of the water balance are provided in the first row of inflows in Table 3-5.

As shown in the table, deep percolation of precipitation averages 1,753 AFY for the Temescal Subbasin, accounting for about 11 percent of the total average subbasin inflow and about 7 percent of average precipitation over the Study Period. During that time period, recharge from deep percolation ranged from 0 AFY to 12,694 AFY.

Return Flows

When land is irrigated, either for agricultural or urban landscape uses, most of the water is consumed through ET, but some water typically percolates to the underlying water table (depending on irrigation efficiency). Urban return flows may also include leakage from septic systems, municipal pipelines, or other urban uses. Figure 8 shows general land uses in the Study Area for 1984 and 2004. For the purposes of this analysis, any area that currently receives water from a municipality is considered part of the urban area.

Urban Return Flows

The analysis of urban return flows involved evaluation of 1) the amount of municipal water used outdoors and 2) the portion of outdoor water that percolates to groundwater. Urban outdoor water use generally involves landscape irrigation, with different customer types (e.g., single family homes, multiple family homes, commercial/industrial, and landscape irrigation) using a different portion of water outdoors. The distribution of customer types in Corona was obtained from the City's Urban Water Management Plan (AKM, December 2005) and the amount of water served to each customer type was totaled. Estimation of the portion of water used outdoors for different customer types was derived from online DWR data on indoor/outdoor use for the North Riverside Detailed Analysis Unit from 1998-2004. While the relative portions of indoor and outdoor water use varied significantly from year to year, representative apportionments of 40 percent water use indoors and 60 percent water use outdoors was selected for multiple family homes. The apportionments for commercial customers and single family homes were similar. Applying these apportionments to the customer types and total water use, the portion of the total water supply used outdoors was estimated at 62.7 percent.

The urban return flow is the portion of applied irrigation water that exceeds the ET demands of the landscaping. For the purposes of this analysis, it was assumed that landscape irrigation water is not typically allowed to run off. Assuming that the average irrigation system is 90 percent efficient, then 10 percent of the applied water results in return flows to groundwater. Thus for each year, 10 percent of the water used outdoors returns to the aquifer as percolation.

A similar calculation addresses additional urban areas served by the City of Norco and Home Gardens County Water District. Assuming that water use has a similar indoor/outdoor apportionment as in Corona, the same portion (62.7 percent) of total water supply used outdoors was assumed. Similarly, it was assumed that 10 percent of the outdoor use would contribute to return flows.

Using this methodology, urban return flows average 1,960 AFY related to the City water supply and an additional 86 AFY associated with other urban water suppliers.

Agricultural Return Flow

Estimation of agricultural return flows was based on the total amount of applied water and the consumed fraction, which represents the portion of applied irrigation that is consumed by the crop through ET. According to the DWR website, the average consumed fraction for citrus crops in the North Riverside DAU from 1998 to 2002 was approximately 74 percent. The remaining 26 percent, assuming no runoff, represents agricultural return flow.

Although agricultural areas are now mostly urbanized, some agricultural areas were persistent in early portion of the Study Period. However, these agricultural return flows are small and average about 61 AFY, or less than one percent of total inflows to the groundwater subbasin. Total return flows for both urban and agriculture for Temescal Subbasin average about 2,108 AFY, about 13 percent of total inflows (Table 3-5).

Infiltration of Runoff

Although large amounts of natural runoff are generated in the Santa Ana Mountains west of the subbasin, most of this runoff is captured by the City's stormwater management system and is unavailable for infiltration into the groundwater basin. Two large flood control (detention) basins, the Oak Avenue Basin and the Main Street Basin, have been constructed on two main drainageways along the mountain front. These basins are owned and operated by the Riverside County Flood Control and Water Conservation District (RCFCWCD). The locations of these basins are shown on Figure 7. The Oak Avenue and Main Street detention basins together cover 28 acres and hold 240 AF of water at full capacity (about 120 AFY each) (PBS&J, 2004). The basins are operated to only detain peak flows and only a small amount of runoff is estimated to infiltrate the basin floor. Almost all of the flow is diverted into lined canals that drain to a lined portion of Temescal Wash, which ultimately conveys the runoff out of the subbasin. The only other large drainageway that provides significant runoff to the subbasin is Bedford Wash in the south. Runoff on this drainage is also lost from the Temescal Subbasin as it flows into Temescal Wash.

A variety of methodologies were examined to estimate the potential annual recharge through the Oak Avenue and Main Street detention basins, resulting in a wide range of possible values from several hundred AF to several thousand AF. The evaluation considered the potential wetted area, potential infiltration rates, variations in annual runoff, and anecdotal information on the number of days that water is observed in the basins. It was determined from this review that reasonable ranges of potential infiltration varied considerably. However, since the basins are operated only to detain peak flows for a very short duration, it was determined that a conservative average of infiltration would be appropriate for the water balance. As such, an estimated infiltration volume of 480 AFY is used. This is equivalent to about 240 AFY for each basin and assumes that an amount equal to twice the total basin capacities infiltrates to groundwater each year. This is considered a conservative amount and represents only about five percent of the runoff that could potentially reach the detention basins. The 480 AFY is maintained for every year in the Study Period. (The slightly different amount of 478 to 482 shown on Table 3-5 reflects rounded values extracted from detailed groundwater model budget outputs).

Another area for potential infiltration of runoff exists on the eastern side of Temescal Subbasin where Temescal Wash enters the subbasin from Temescal Canyon (Figure 7). Here, surface water is allowed to infiltrate along a short segment of the subbasin before entering a lined culvert near Magnolia Avenue (lined portion shown on Figure 7). The area available for recharge has historically been characterized by high groundwater, apparently from surface water infiltration and fine-grained soils at the surface. As such, infiltration from the wash is thought to be small and has been calculated by applying Darcy's Law to the subsurface area of Temescal Wash. This method results in an estimate of about 113 AFY of recharge, on average. In the absence of data that would be needed to allow this number to vary within a reasonable range of values, the average amount is applied to the water balance for each year of the Study Period as shown on Table 3-5.

Wastewater Recharge

Since the 1950s, the City has discharged treated wastewater into unlined ponds in northern Temescal Subbasin. The current locations of the percolation ponds are indicated on Figure 33 and a graph of wastewater discharge to the ponds is provided on Figure 21. The three ponds, referred to as Lincoln, Cota North, and Cota South, range in size from 2.95 acres to 6.81 acres, and together total 16.51 acres. Since 1984, effluent volumes have ranged between 3,649 AFY and 9,476 AFY (Figure 21).

A 2006 wastewater pond investigation documented high historical percolation rates, ranging up to 25 feet per day (AKM, 2006). During the time of the investigation, percolation had decreased to less than 1 foot per day due to the buildup of clogging particles and organic material on the bottom of the ponds. As recommended in the investigation report, removal of fines and other pond rehabilitation methods were implemented and the higher percolation rates were restored. The amount of evaporation from the ponds is estimated to be small, given the high percolation rates and observations by City staff (perhaps about 30 inches or 40 AFY) and was not incorporated into the recharge amounts. As such, recharge to Temescal Subbasin from the wastewater discharge ponds is estimated to range from about 3,650 AFY to 9,474 AFY and averages 7,112 AFY as shown in Table 3-5.

A portion of the wastewater from WWTP No. 1 is now treated to tertiary levels and used for park irrigation. This change in operation occurred late in the Study Period (2002) and adds only a small amount of additional return flows for 2003 and 2004. As such, it is considered to have a negligible effect on the water balance.

The City operates a third WWTP, located at the southeast corner of Temescal Subbasin. Wastewater is used for local irrigation, with a small percentage discharged to Temescal Wash. Any addition of wastewater does not affect the water balance as the recharge from Temescal Wash is limited by lined channels and has been estimated at 113 AFY as described above.

Subsurface Inflow

Subsurface inflow contributes to the Temescal Subbasin from adjoining basins. In addition, some inflow likely occurs along the entire circumference of the Study Area from adjacent bedrock. General areas where subsurface inflows and outflows occur are indicated conceptually by arrows on Figure 33 and described in more detail below.

Subsurface Inflow at Arlington Gap into Temescal Subbasin

Water level contour maps indicate that groundwater enters the Temescal Subbasin from the Riverside-Arlington Basin through a narrow arm of the alluvial basin referred to as the

Arlington Gap (Figure 33). To estimate the volume of subsurface inflow across Arlington Gap, a calculation applying Darcy's Law was conducted using the cross-sectional area of water-bearing sediments, estimated hydraulic conductivity values, and a measured hydraulic gradient of 0.0028 ft/ft across the subbasin boundary. This amount was used as a preliminary target for inflow at this boundary in the groundwater model. Inflow amounts estimated by the model are provided on Table 3-5 and average 3,620 AFY. The methodology of the initial Darcy's Law calculation is described below.

As shown on cross-section C-C' (Figure 14), the saturated aquifer thickness at Arlington Gap (as defined by DWR Well 193583) is about 400 feet and includes both the Channel Aquifer and underlying Tertiary-age sandstones. Applying a K value of 1,500 gpd/ft^2 (200 ft/day) to the Channel Aquifer and 100 gpd/ft^2 (13 ft/day) to the Sandstone Aquifer results in an estimated average annual subsurface inflow through Arlington Gap of 4,869 AFY, of which 95 percent is represented by groundwater flow through the Channel Aquifer. This volume is in close agreement with a previous estimate by DWR of 3,000 AFY (DWR, 1947).

This value was tested in the groundwater flow model. As described in Appendix C, the boundary condition at the Arlington Gap was simulated with a specified head tied to water level data in a production well operated by Home Gardens Water District and located near the gap. As shown on Table 3-5, groundwater modeling indicated that inflow at the gap averaged 3,620 AFY over the Study Period and ranged from about 4,880 AFY to 2,225 AFY. Inflow decreased over the last few years in the Study Period in response to declining water levels in the well.

Subsurface Inflow from Surrounding Bedrock

Although limited by permeability, the bedrock surrounding the groundwater subbasin is recharged by small amounts of local precipitation. This bedrock groundwater system is in direct hydraulic communication with the groundwater in the alluvial basin over a relatively large area in the subsurface. Assuming that bedrock recharge and subsurface inflow will vary with precipitation, a soil moisture balance was calculated on the watershed area and the resulting groundwater recharge was used to approximate subsurface inflow. This amount was adjusted upward during model calibration.

Using these methods, about 783 AFY on average is estimated to provide subsurface inflow to the Temescal Subbasin from adjacent bedrock areas (Table 3-5). Although the amount was assumed to vary somewhat with precipitation, the lag time for inflow is unknown. Therefore a simplifying assumption was made using the average amount of inflow for each year in the Study Period as shown on Table 3-5. This inflow is relatively small and represents less than one percent of total precipitation in the watershed.

Subsurface Inflow from Norco Area

Although most of the Norco area is included within the Temescal Subbasin boundaries as provided by DWR, there are significant unknowns associated with the area. Alluvial sediments appear to be thin and interrupted by bedrock highs. In addition, a groundwater divide is indicated by the data, with some groundwater flow indicated to the north toward the Santa Ana River and exiting the subbasin. The area that contributes groundwater flow to the Temescal Subbasin is uncertain. As such, the area was simulated in the groundwater model as providing a specified flow into the subbasin, derived from a simple calculation of subsurface inflow using Darcy's Law. That calculation indicated an inflow of approximately 52 AFY, an amount that was held constant as an annual subsurface inflow for Temescal Subbasin water balance (Table 3-5).

3.6.2.2. Outflows from Temescal Subbasin

Two outflows from the subbasin have been accounted for in the water balance. The largest of these is groundwater pumping, mostly from the City's production wells. The other outflow component is the amount of groundwater that rises to surface water and contributes to the Santa Ana River outflow at Prado Dam. The incorporation of these components in the water balance is described below.

Pumping

Water pumped from the subbasin supplies water for urban, agricultural, and industrial uses. During the Study Period (1990 -2004), municipal uses account for 94 percent of the production. Pumping totals from the DMS were input into the water balance and the groundwater model. The monthly distribution of pumping used in the groundwater model was determined from the time period when monthly data were available and average monthly percentages were applied to annual totals.

As shown on Table 3-5, pumping represents the primary outflow in the water balance. During the Study Period, production in Temescal Subbasin averaged 12,601 AFY and ranged from 7,294 AFY to more than 20,000 AFY. In general pumping has increased during the Study Period with a significant increase beginning in 2002 when pumping exceeded 19,000 AFY. From 1990 to 2002, pumping averaged 10,821 AFY. From 2002 through 2004, average pumping increased more than 80 percent to 19,724 AFY. Section 3.4 provides a more complete discussion of pumping in the Study Area.

Subsurface Outflow

Subsurface outflows from the Temescal Subbasin are interpreted to occur at two main locations: contribution to baseflow at the Santa Ana River and contribution to Temescal Creek baseflow near Bedford Canyon. Methodology was similar to the calculations for subsurface inflow previously described.

Subsurface Outflow from Temescal Subbasin at Santa Ana River

Groundwater level contours in the Study Area (Figures 26 and 27) indicate that groundwater flows out of the Temescal Subbasin in the Prado Management Area (flood control basin) of the Santa Ana River (northern portion of the Study Area). Groundwater rises and discharges from the valley via surface water flow at Prado Dam. However, to incorporate subsurface data and provide a more reliable estimate of this amount, the outflow calculation was initially estimated at a location judged to be just upgradient of groundwater discharge to surface water.

To estimate the annual volume of subsurface outflow from Temescal Subbasin, the same methodology and K values were applied as those used for the Channel Aquifer and Tertiary deposits in the Arlington Gap inflow calculation. A hydraulic gradient of 0.0009 ft/ft was measured across the northwestern boundary of Temescal Subbasin, and an average saturated thickness of 600 feet was assumed for the Tertiary deposits. Results of the calculation using Darcy’s Law indicate that the estimated annual subsurface outflow from Temescal Subbasin is 4,352 AFY, of which 90 percent is represented by groundwater outflow through the Channel Aquifer. This volume is within the previously estimated range of 3,000 to 9,000 AFY made by USGS in a study of groundwater outflow to Prado Management Area (French, 1972).

In order to analyze the variability of this outflow, output from the calibrated groundwater model was reviewed. This boundary was simulated as a general head boundary based on elevation of the pool at Prado Dam. Details of this boundary condition are provided in Appendix C. The model output agrees closely with the estimates from the calculations described above. These amounts are provided as outflow from the basin and are listed in Table 3-5. As shown in the table, average outflow to surface water is estimated at 4,062 AFY and varies within a relatively narrow range from 3,944 AFY to 4,123 AFY.

Subsurface Outflow from Temescal Subbasin along Bedford Canyon

Subsurface outflow from Temescal Subbasin at the subbasin southeast corner is interpreted to occur in the alluvial sediments of Bedford Canyon. According to hydrographs in this area (e.g., Figure 25 with location on Figure 22), groundwater discharge to surface water occurs in this area as Temescal Wash enters Temescal Canyon. Runoff contributing to infiltration along Bedford Wash is not accounted for in the water balance and is assumed to exit the subbasin as either groundwater or surface water. Because this area does not impact the remaining portions of the water balance, inflows and outflows are not included for this area.

Total Outflows

As shown on Table 3-5, total outflows from Temescal Subbasin, including pumping and subsurface outflow, average 16,663 AFY, about 642 AFY larger than average inflows. Outflows were generally less than inflows on an annual basis for most of the early years of the Study Period.

In recent years, outflows have exceeded inflows, especially in 2002-2004 when pumping amounts increased to about 20,000 AFY.

3.6.2.3. Change in Groundwater Storage in Temescal Subbasin

Groundwater in storage refers to the volume of groundwater in the saturated aquifers from the water table down to a level where groundwater extraction is limited by factors such as deteriorating water quality, insufficient permeability, or excessive lift costs. The amount of groundwater in storage changes from year to year with climatic variation and basin operation (i.e. pumping). The water balance provides a regional assessment of the change in storage by estimating how much water is entering and leaving the groundwater basin on an average basis and serve as an initial guide to the average amount of groundwater that can be extracted without significant depletion of groundwater. The balance is only an initial indication; changes in groundwater storage from pumping are controlled by pumping locations, boundary conditions, and the ability of pumping to capture inflows and outflows in the basin.

The change in groundwater storage predicted by the water balance is the subtraction of outflows from inflows. Although this calculation can be made annually, the change in storage over the Study Period is more representative of groundwater basin response to variable hydrologic conditions over time. The cumulative change in storage over the Study Period is also tabulated on Table 3-5 and represented by the graph at the bottom of the table.

For the Temescal Subbasin, the change in groundwater storage over the Study Period is estimated at -9,627 AF, an average deficit of about -642 AFY. The graph on Table 3-5 tracks the cumulative change in groundwater storage for each year of the Study Period (blue line on the graph on Table 3-5). The change in storage became negative only in the last two years of the Study Period, a time when average inflows were a little less than average (especially in 2003), but outflows increased more than 40 percent from average outflows due to increased pumping.

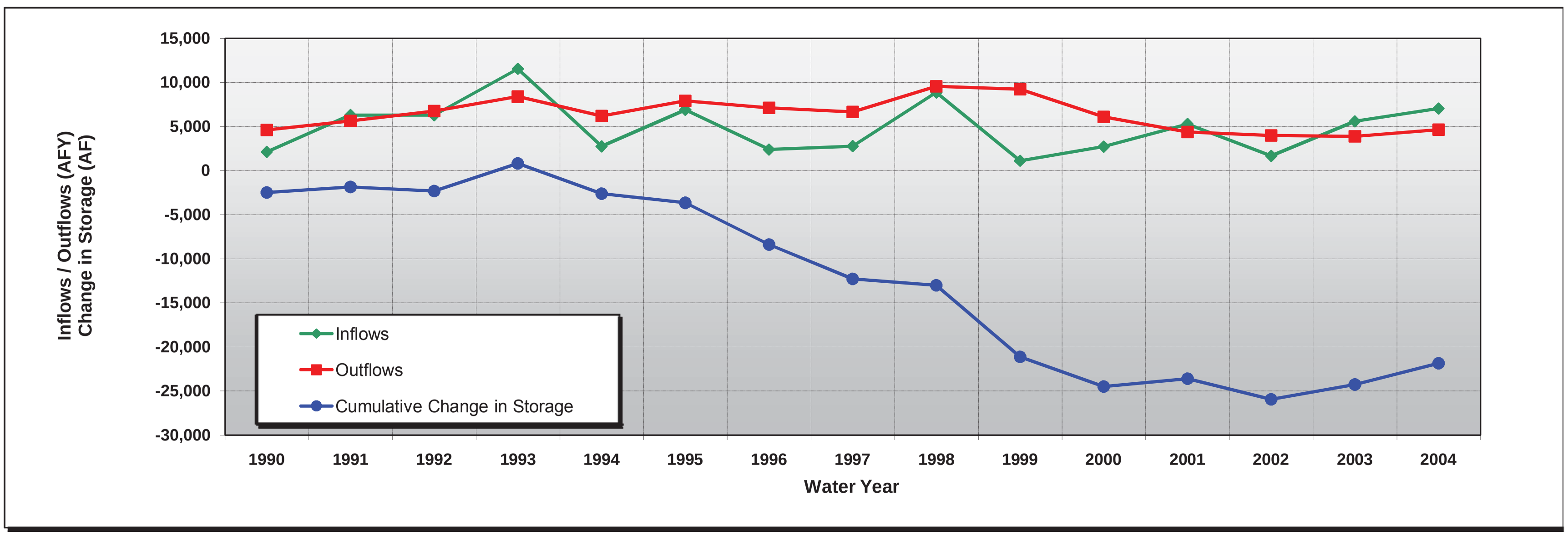
The deficit in cumulative change in storage is judged reasonable given that water levels have generally declined from 1990 to 2004. However, given that the pumping is primarily in the Channel Aquifer in the northern portion of the subbasin (Figures 16 and 18), the decline in water levels has not likely occurred on a basin-wide basis. Hydrographs in the Channel Aquifer indicate a water level decline of about 10 feet over the Study Period (e.g., Figure 23). The Channel Aquifer extends over about 3,000 acres and has an estimated specific yield of about 20 percent. Using these data and assuming an aquifer-wide water level decline, the change in storage is estimated at about -6,000 AFY. This amount is reasonably close to the average estimated change in storage in the water balance of -9,627 AFY (Table 3-5).

3.6.3. Coldwater Subbasin Water Balance

The water balance for the Coldwater Subbasin was initially conducted through an independent evaluation of the different components of inflow and outflow from the subbasin. The resultant change in storage was checked for reasonableness by estimating the change in storage indicated by water level fluctuations over the Study Period. The methodology for each of these steps is summarized below. Table 3-6 summarizes the water balance.

Table 3-6
Water Balance Summary for Coldwater Subbasin

Water Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Ave.
INFLOWS																
Deep Percolation from Precipitation	69	434	548	1,424	111	623	55	96	891	29	138	435	49	375	544	**388**
Subsurface Inflow from Watersheds	4	13	28	576	1	24	1	3	42	0	3	27	1	11	14	**50**
Return Flows																
- Agriculture	33	42	45	46	49	50	53	21	47	54	3	12	0	0	0	**30**
- Urban	127	159	169	149	135	121	165	166	200	162	160	143	121	118	160	**150**
- Industrial	226	183	149	112	95	98	124	132	143	210	42	129	158	189	324	**154**
Infiltration from Runoff	1,554	5,362	5,245	9,130	2,252	5,870	1,888	2,242	7,429	555	2,273	4,435	1,227	4,788	5,890	**4,009**
Glen Ivy Hot Springs Discharge	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
TOTAL INFLOWS (AFY)	**2,102**	**6,283**	**6,273**	**11,525**	**2,733**	**6,876**	**2,376**	**2,751**	**8,843**	**1,099**	**2,709**	**5,270**	**1,645**	**5,571**	**7,023**	**4,872**
OUTFLOWS																
Pumping	4,600	5,630	6,758	8,100	6,066	7,746	7,073	6,646	9,461	9,231	6,082	4,377	3,984	3,877	4,635	**6,284**
Subsurface Outflow to Bedford Subbasin	0	0	0	280	110	160	50	0	90	0	0	0	0	0	0	**46**
TOTAL OUTFLOWS (AFY)	**4,600**	**5,630**	**6,758**	**8,380**	**6,176**	**7,906**	**7,123**	**6,646**	**9,551**	**9,231**	**6,082**	**4,377**	**3,984**	**3,877**	**4,635**	**6,330**
Cumulative Change in Storage (AF)	**-2,498**	**-1,845**	**-2,329**	**816**	**-2,627**	**-3,657**	**-8,404**	**-12,299**	**-13,007**	**-21,140**	**-24,513**	**-23,619**	**-25,958**	**-24,264**	**-21,876**	



3.6.3.1. Inflows to Coldwater Subbasin

Deep Percolation from Rainfall

Deep percolation was calculated over the Study Area using two steps: a runoff analysis and a soil moisture balance, using the same methodology described for the Temescal Subbasin water balance. As shown in Table 3-6, deep percolation of precipitation is estimated to average 388 AFY for the Coldwater Subbasin, or about 8 percent of the total inflows. The amount is variable from year to year and is most significant during wet years (e.g., 1,424 AFY in 1993). The amounts are slightly higher than would be anticipated for average rainfall due to the open pits, permeable surface soils, and relatively un-vegetated industrial area of gravel mining in the southern portion of the subbasin.

Infiltration of Runoff

For Coldwater Subbasin, large amounts of runoff are generated in the Santa Ana Mountains adjacent to the basin and, unlike Temescal Subbasin, are not funneled into concrete lined culverts. The amount of water available for recharge varies annually with changes in rainfall and runoff amounts. Runoff was estimated from the contributing watershed using the same Curve Number methodology described in the Temescal Subbasin water balance.

Runoff into the Coldwater Subbasin is subject to ET, infiltration, or continued surface flow to the local drainageway of Temescal Wash. The contributing watershed to Coldwater Subbasin is comprised of about six individual watersheds. From south to north these are Mayhew Canyon, Coldwater Canyon, Anderson Canyon, Bixby Canyon, Brown Canyon, and smaller drainages south of Bedford Canyon. The northern subbasin is more developed and contains a stormwater control system. Therefore, it was assumed that runoff from the northern watersheds (i.e., Anderson, Bixby, Brown, and smaller drainages) do not significantly contribute to groundwater recharge. Runoff from Coldwater and Mayhew canyons, however, are diverted and managed for recharge and, as such, contribute significant amounts of inflow into the subbasin. Runoff from these two individual watersheds was based on the percentage of the entire contributing watershed area represented by Coldwater and Mayhew watersheds.

Runoff from Coldwater and Mayhew canyons is captured and diverted to gravel pits or spreading areas for groundwater recharge in the subbasin (MWH, 2004). The City has constructed berms and in-stream diversion structures along Coldwater Wash (assisted by Chandler Inc., the operator of the adjacent sand and gravel mining operation). Numerous berms capture streamflow and allow for infiltration into the permeable gravels of the streambed. EVMWD diverts varying amounts of surface water runoff along Mayhew Wash to gravel pits for enhanced groundwater recharge. Some portion of the diverted water may also provide irrigation to agriculture users in the subbasin, but the amount dedicated to such use is not documented (MWH, 2004).

Although most of the Coldwater and Mayhew runoff is conserved, wet years generate large amounts of water that bypass the recharge structures and flow to Temescal Wash (in some years causing flooding of local roads). For purposes of the water balance, in years with a total of more than 6,000 AFY of runoff it was assumed 85 percent of the runoff from Coldwater and Mayhew basins infiltrate to the groundwater system leaving about 5,000 AF over the study period that could not be captured. In years generating less than 6,000 AFY, 100 percent of the runoff was assumed to infiltrate, although some large storms may not be fully captured. In addition, the ET demands of the land cover were already taken into account in the runoff calculations. The total runoff resulting in groundwater recharge is estimated to average 4,009 AFY (Table 3-6). Runoff and recharge vary significantly from year to year with changes in precipitation.

Subsurface Inflow from Surrounding Bedrock

Subsurface inflows from bedrock were estimated for the Coldwater Subbasin using a similar methodology as the Temescal Subbasin water balance. Inflow is estimated to average only about 50 AFY (Table 3-6). This component represents the only subsurface inflow component applicable to Coldwater Subbasin.

Wastewater Recharge

Glen Ivy Springs operates a spa facility in the Coldwater Subbasin. The facility discharges approximately 90 AFY (per their NPDES permit) to a diversion channel that funnels discharge into Coldwater Wash (RWQCB, 2004). This flow is retained by the City's in-stream berms and is assumed to infiltrate to the groundwater. No other discharge of wastewater is known to exist in the Coldwater Subbasin.

Return Flows

Water supply available for return flows in the Coldwater Subbasin originates from several water sources. Total water supply includes groundwater pumping within the subbasin, imported water from LLWD (purchased from WMWD through Metropolitan), imported non-potable water by EVMWD from Corona Lake, and imported water from deep pumping by Glen Ivy Hot Springs (below the potable groundwater subbasin). A portion of the subbasin pumping is exported and not available for return flows within the subbasin. Groundwater pumping by the City of Corona is exported to the Temescal Subbasin. In addition, a portion of the EVMWD pumping provides water supply to the Butterfield Estates trailer park, just outside of the subbasin. The amount of exported pumping was not included in the return flow estimates for the subbasin.

Urban Return Flow

Urban return flows were estimated for the Coldwater Subbasin using the same methodology as used in the Temescal Subbasin. Land use data from DWR were used to identify changing urban areas during the Study Period. Urban water use was derived from total pumping plus imported water less basin exports. These exports include pumping by the City of Corona and

EVMWD, who provides water supply to Butterfield Estates located just outside of the subbasin boundary. Assuming that water use has a similar distribution as in the City of Corona, the same portion (62.7 percent) of total water supply used outdoors was assumed. Similarly, it was assumed that 10 percent of the outdoor use would contribute to return flows. As shown in Table 3-6, this methodology indicates that urban return flows in the Coldwater Subbasin average about 150 AFY.

Agriculture Return Flow

As documented in Table 3-6, agricultural return flows contribute only minor amounts of inflow to groundwater due to decreases in agriculture land use. Agriculture return flows in Coldwater Subbasin averages 30 AFY, but is thought to be higher prior to the beginning of the Study Period (before 2000).

Industrial Return Flow

Some industrial return flows are anticipated from sand and gravel mining use of groundwater. Groundwater is used to wash fines from the excavated sediments, and a portion of this water is returned to the gravel pits. Gravel mining operations are active in Coldwater Subbasin during the entire Study Period; however, pumping totals are small relative to pumping amounts by the City and EVMWD. Evaporation from the gravel pits and other losses associated with the mining operation are estimated to be small compared to the amount of water allowed to infiltrate back to the groundwater system. It was assumed 90 percent of industrial pumping becomes return flows.

Total Inflows

Total inflows for the Coldwater Subbasin are much lower than inflows into the Temescal Subbasin due to the smaller areal extent and relatively closed nature of the subbasin. Accounting for all of the inflows discussed above, total inflows are estimated to range from 1,099 AFY to 11,525 AFY and average 4,872 AFY over the 2,176 acres in the subbasin (Table 3-6).

3.6.3.2. Outflows from Coldwater Subbasin

Outflows from the subbasin include groundwater pumping and subsurface outflow to the Bedford Subbasin under certain conditions. Pumping represents the primary outflow in the water balance (Table 3-6). During the Study Period, production in Coldwater Subbasin averaged 6,284 AFY (Table 3-6). Section 3.4 provides a more complete discussion of pumping in the Study Area. Assumptions regarding the outflow to Bedford Subbasin are described below.

Subsurface Outflow from Coldwater Subbasin to Bedford Subbasin

The North Glen Ivy fault forms the subbasin boundary between Coldwater and Bedford subbasins. Details of where and under what conditions groundwater moves across the fault are not well understood. However, it is likely that when groundwater outflow occurs, it does so in the central portion of the subbasin, based on natural surface water drainageways, topography, and the incised nature of shallow sediments and bedrock in the area. Estimates of subsurface outflow across the fault have been made by MWH (2004), which were interpreted to occur only in times of relatively high water levels. Those estimates were determined to be reasonable for this water balance and are incorporated for years in which outflow is estimated to occur (Table 3-6). These outflows are estimated to range between 50 AFY and 280 AFY and average only 46 AFY over the Study Period (Table 3-6). Declining water levels have resulted in a relatively closed basin over the last few years and it is assumed that during this time, subsurface outflow does not occur.

As shown on Table 3-6, total outflows from the Coldwater Subbasin are estimated to average 6,330 AFY over the Study Period. This amount exceeds inflows by an average of 1,458 AFY.

3.6.3.3. Change in Groundwater Storage in Coldwater Subbasin

The change in storage in the Coldwater Subbasin indicates a larger deficit in storage (Table 3.6) than occurred in Temescal Subbasin over the Study Period. The water balance indicates a cumulative loss of groundwater storage of about -21,876 AFY, an average deficit of about -1,629 AFY. To compare this deficit with declining water levels, a groundwater storage change was computed using water levels and subbasin hydrographs (e.g., Figure 24). These graphs indicate a decline in water levels of about 100 feet from 1990 to 2004, likely concentrated in the western subbasin where pumping occurs. Using a specific yield of 20 percent in the sediments where the decline has occurred and applying the deficit over approximately one-half of the subbasin, the change in storage over the Study Period is estimated at -21,760 AF. This estimate is consistent with the deficit predicted from the water balance. In addition, the graph on Table 3.6 showing the cumulative change in storage mimics the shape of the water level hydrograph on Figure 24 for the Study Period. This agreement provides additional confirmation of the average water balance estimates.

3.6.4. Water Balance Discussion

The results of the water balances indicate a negative change in storage at average pumping conditions in both Temescal and Coldwater subbasins over the Study Period. This indicates that more water is being withdrawn from the subbasins than will be naturally replenished over time, a condition referred to as overdraft. The water balances also provide a preliminary assessment for the operational range of the subbasins. Assuming no other significant changes in the water balance, average pumping totals of about 12,000 AFY in Temescal Subbasin indicate no significant loss of groundwater storage. For Coldwater Subbasin, average pumping totals around 4,500 AFY also indicate no significant loss of groundwater storage. These estimates are simplistic and do not take into account other changes in the water balance resulting from pumping decreases (such as potential increases in subsurface outflow or reduced return flows). Nonetheless, they provide a preliminary estimate for guiding management scenarios.

Although the Study Period is conservative, containing slightly below-average precipitation and ending with drought conditions, neither the Temescal or the Coldwater subbasin appears to be sustainable at the average pumping amounts unless additional recharge (natural or enhanced) can be captured. With an expected increase in demand associated with City build out, management strategies will be necessary to use the groundwater resource in a sustainable manner. An evaluation of current and future water demand as well as additional sources of water supply are provided in the following section.

4. City of Corona Water Demand and Supply

In order to manage the groundwater resource and provide for planned growth associated with build out, the City has examined current and future demand as well as water supply from other sources. Demand increases are categorized by water use type through 2030. The City is also taking measures for water conservation and demand management. Collectively, these data are summarized in previous City evaluations presented in their Water Master Plan (AKM, April 2005) and their Urban Water Management Plan (AKM, December 2005) and have been updated for this GWMP.

4.1. Current and Future Demand

The City has a wide array of water users, classified by sectors: residential single-family, residential multi-family, commercial, industrial, institutional/governmental, landscape, and agricultural. Total current water demand is 45,600 AFY (not including water transfers wheeled to the City of Norco and Western Municipal Water District in Calendar Year 2007). This represents a 15 percent increase from 2000 usage of 39,634 AFY.

Ultimately the City anticipates a total demand of 51,631 AFY by the year 2020 (projected City build out). In addition to use demand, the City must also account for spent filter backwash (from the Lester and Sierra del Oro water treatment plants) and brine reject (from the Temescal Desalter), which is currently 2,300 AFY. This amount is expected to increase to 2,954 AFY by 2020. A brief summary of the categories of water users and expected changes in the future are described below and summarized on Table 4-1.

Residential – Single-Family

In the City of Corona, a single family residential customer averages 3.5 persons per connection. Corona is a suburban community with approximately 30 percent of its acreage comprised of residential use. Total system consumption for this sector was 22,863 AF in 2000. Current consumption levels are at 28,000 AFY and are expected to ultimately increase 16 percent by year 2020 to 32,471 AFY. At build out, the single family residential water use will represent 63 percent of the total demand.

Residential – Multi-Family

Multi-family residential customers average 3.35 persons per household. Like the single-family residential sector, the multi-family sector is expected to experience significant growth over the next 15 years, but total demand is significantly less than for the single family sector. Currently the multi-family residential sector is using 4,000 AFY from 1,600 connections and is expected to increase to a total sector usage of 9,048 AFY with 3,601 connections by 2020.

Commercial

The City has a large mix of commercial customers that are categorized as general commercial, office professional, and downtown commercial. General commercial accommodates many commercial uses that service the community such as department stores, banks, supermarkets, and retail stores. Office professional includes general business, finance, insurance, real estate, and medical offices. Downtown commercial is intended to create a pedestrian-oriented street environment with such uses as retail shops, offices, services, cultural facilities, entertainment, and civic and public uses. Current commercial water use has grown about 18 percent to 1,700 AFY since the year 2000 and will ultimately grow to 1,980 AFY by 2020.

Industrial Sector

Corona has a large industrial base that is centered on high-tech and manufacturing. The industrial sector has increased water usage by 19 percent from 2000 to present and accounts for 3,200 AFY. This usage is expected to grow to 3,679 AFY by 2020.

Institutional/Governmental

The City has a stable institutional and government sector, primarily local government, schools, visitor services, and a public hospital. This sector will keep pace with the growth of the city.

Landscape

Landscape water use would be expected to increase with the growth of the city, fueled mainly by residential development. But increased efficiency and landscape conversions occurring at existing parks, golf courses, and cemeteries should help offset new demand and result in decreased water use in the future. Additional information on the City’s water conservation and demand management efforts are described in Section 6.1.9 (management strategy 25).

Agriculture

Agricultural water demand has declined over the past 20 years, but is projected to remain fairly constant over the next 20 years. The City’s General Plan reflects local citizen interest in space, quality of life, environmental values, and the long-term maintenance of a diverse economic base. It is projected that these objectives will be met with urban uses and open space rather than with agricultural land.

Table 4-1
City Current and Future Demand (AFY)

Year	Water Use Sectors	Single Family	Multi-Family	Comm.	Ind.	Special Acct.	Instit./ Gov.	Land-scape	Ag.	Total
2000	No. of accounts	33,616	1,355	277	515	3	9	583	35	36,393
	Deliveries AFY	22,863	3,405	1,443	2,679	666	82	3,230	480	39,634*
2005	No. of accounts	38,164	1,538	315	584	3	11	662	40	41,317
	Deliveries AFY	25,956	3,866	1,638	3,042	756	93	3,668	545	45,000*
2010	No. of accounts	42,593	3,213	339	631	3	10	485	34	47,308
	Deliveries AFY	28,968	8,072	1,766	3,282	740	79	2,686	468	46,062
2015	No. of accounts	44,140	3,329	352	654	3	10	502	35	49,026
	Deliveries AFY	30,020	8,366	1,831	3,401	767	82	2,783	485	47,735
2020	No. of accounts	47,743	3,601	380	707	4	11	543	38	53,028
	Deliveries AFY	32,471	9,048	1,980	3,679	830	89	3,010	524	51,631
2025	No. of accounts	47,743	3,601	380	707	4	11	543	38	53,028
	Deliveries AFY	32,471	9,048	1,980	3,679	830	89	3,010	524	51,631
2030	No. of accounts	47,743	3,601	380	707	4	11	543	38	53,028
	Deliveries AFY	32,471	9,048	1,980	3,679	830	89	3,010	524	51,631

*Total deliveries include sales/transfers to the City of Norco and WMWD.

4.2. Water Conservation and Demand Management

The City recognizes the importance of continuing current efforts for conserving water and decreasing demand. As such, they became a signatory to the California Urban Water Conservation Council (CUWCC) MOU in 1996 and are committed to implementing the 14 Best Management Practices (BMPs) in the MOU. The City has retained a Water Conservation Coordinator to lead these efforts.

The City and the Water Conservation Coordinator have developed and implemented an extensive water conservation education system, including a dedicated education center at the City's treatment plant. Materials and information on water conservation have been prepared and presented in schools (K-12) across the City. Last month alone, the Coordinator interacted with about 500 children in connection with numerous education programs, a total representative of a typical month. These programs not only provide basic information to younger children (typical of many programs), but also specifically develop material to target grades 6 through 12. It is more difficult and time-consuming to prepare materials for the older grade levels because much more detail is required. However, targeting the older children provides a higher level of education and potentially more benefits in promoting good stewardship of their water resource.

The City also sponsors numerous events that are focused on water. In May, the City held their third annual Water Festival, an event that attracts about 1,500 attendees. The City has also developed a Water Wise landscape award that is publicized to encourage residential responsibility. In addition to their own events and programs, the City participates in water conservation programs developed by Metropolitan and WMWD.

Since the single-family and multi-family residential sectors represent the largest growth in demand over the next 15 years, the City of Corona has implemented a water use efficiency program to offset increasing water demands. The program strives to increase water use efficiency by supporting water use surveys for residential and public facilities, ultra low flush toilet replacement, and educational/informational programs. Increased efficiency and landscape conversions occurring at existing parks, and golf courses should help offset new demand and result in decreased future water use for landscape irrigation.

4.3. Supply

The City water system contains potable water from two sources: local groundwater and imported water. The groundwater source includes the three groundwater subbasins described in this GWMP. The source of the imported water is the Colorado River and State Water Project water supplied by Metropolitan and purchased through WMWD. The supply obtained from each groundwater well and imported water sources from 1990 through 2007 is summarized in Table 4-2 and discussed in the following sections.

Table 4-2
Water Production and Purchases (AFY)

Source of Supply	Well #	1990	1995	2000	2002	2004	2007
Coldwater Basin	1	1,062	1,685		0	0	0
	2	0	1,191		0	0	0
	3	1,024	1,391	506	0	380	1,083
	20	0	0	0	0	0	430
	21	_	_	3,493	2,579	2,400	2,004
	Subtotal	*2,086*	*4,267*	*3,999*	*2,579*	*2,780*	*3,517*
Temescal Subbasin (including Well 4 in Bedford Subbasin)	4	253	173	0	0	0	0
	6	535	588	436	27	0	0
	7	531	654	876	12	0	0
	7A	0	0		15	1,202	1,149
	8 and 8A	1,164	1,737	1,654	1,517	2,081	1,812
	9 and 9A	650	467	554	14	2,480	1,443
	11	316	408	354	123	501	553
	12A	134	0	0	614	575	477
	13	886	0	0	0	231	699
	14	75	310	534	674	645	635
	15	761	1,150	1,633	870	1,480	1,122
	17A	1,059	1,349	959	954	454	1,701
	19	_	_	2,123	2,184	1,497	1,696
	22	0	0	0	4,465	2,885	2,343
	23	_	_	_	_	_	0
	24	0	0	0	679	200	394

Source of Supply	Well #	1990	1995	2000	2002	2004	2007
	25	0	0	0	3,686	2,386	1,334
	26	0	0	0	1,383	996	934
	27	0	0	0	0	253	184
	28	0	0	0	0	1,369	2,324
	Subtotal	*6,111*	*6,663*	*9,123*	*17,217*	*19,235*	*18,800*
Metropolitan Raw Water	WR – 19	11,574	6,373	13,920	12,384	11,452	15,638
	WR – 29	451	463	0	0	0	0
	WR – 33	5,471	4,661	6,258	3,924	3,039	3,919
	WR – 24	–	3,797	6,334	7,593	7,451	4,957
Metropolitan Treated Water	Lee Lake	–	–	–	–	98	43
	Subtotal	*17,496*	*15,294*	*26,512*	*23,901*	*22,040*	*24,557*
Total		**25,693**	**26,224**	**39,634**	**43,697**	**44,055**	**46,874**

4.3.1. Groundwater Basins

The City relies on the underlying groundwater for an increasing percentage of its total water supply. The City currently maintains and operates 21 production wells for its municipal potable water supply: 18 wells in the Temescal Subbasin, 3 wells in the Coldwater Subbasin, and 1 former well in the Bedford Subbasin (recently abandoned).

As previously discussed, most of the City's production is from the Channel Aquifer in the Temescal Subbasin. Typical depths for the City's wells in the Temescal Subbasin range from about 200 to 500 feet deep with screens as shallow as about 100 feet below ground surface. The combined capacity of the 18 Temescal Subbasin wells is approximately 23,405 gpm (about 38,000 AFY). Seven of these wells have been installed in the past five years (Wells 22, 23, 24, 25, 26, 27, and 28) to replace older wells and provide additional supply to the Temescal Basin Desalter for the improvement of water quality in the region.

The City pumps about 3,500 AFY from the Coldwater Subbasin from three active wells. The City also acquired the rights to the surface flows of Coldwater Canyon in 1964 when it purchased the assets of the Corona City Water Company (CCWC). To meet regulatory requirements, runoff from the canyon is recharged through in-stream percolation ponds along Coldwater Wash. The City of Corona and EVMWD pump most of the groundwater extracted from the Coldwater Basin.

The City does not currently produce groundwater from the Bedford Subbasin, but has done so in the past at Well 4 located near WWTP 3. Although this well has been recently abandoned, the City has plans to re-drill in the Bedford Subbasin for future water supply.

The three subbasins from which the City extracts groundwater are not adjudicated. However, under a stipulated judgment entitled *Orange County Water District vs. City of Chino, et al*. (1968), the City, with other purveyors upstream of Prado Dam, have the right to use all surface and groundwater supplies originating above Prado Dam without interference from water purveyors downstream of Prado Dam, provided that the average adjusted base flow at Prado Dam is at least 42,000 AFY. WMWD is one member of a watermaster panel that administers provisions of this judgment. To ensure provisions of the judgment, the City is required to provide a base flow of 1,625 AFY (adjusted for water quality) from the City's WWTP.

The City of Corona has increased the production of local water relative to imported water. In 2000 the groundwater production accounted for 33 percent of the total supply. Last year in 2007 groundwater accounted for 50 percent of total water supply (not including water supplied to the City of Norco or WMWD), which is a 51 percent increase in local production since 2000. Looking forward, Corona would like to maintain an approximate 50 percent groundwater allocation for their water supply by year 2020. Based on the water balance provided in Section 3.6, current groundwater basin conditions in Temescal and Coldwater subbasins cannot support this level of production without significant enhanced recharge.

4.3.2. Imported Water

The City's imported water is supplied by Metropolitan and purchased through WMWD, a member agency of Metropolitan. The imported supply is delivered to the City through two separate pipelines. The Lower Feeder Pipeline supplies raw imported water to the City's Lester and Sierra del Oro water treatment plants (WTPs) through metered turnouts (WR-19 and WR-33 respectively). The Mills Pipeline delivers treated imported water directly to the City through a metered turnout (WR -24).

Turnout WR-19 is located in Chase Drive, east of Lester Avenue. The flow from this turnout is typically delivered by gravity to the City's Lester WTP located on Rimpau Avenue. The Lester Raw Water Booster Pump Station provides additional pumping head when the pressure in the Lower Feeder is not sufficient to deliver flow to the plant by gravity. This treatment plant has a firm treatment capacity of 25 million gallons per day (MGD) with a peak capacity of 30 MGD. In addition, current delivery constraints limit the treatment plant's capacity to 30 MGD. The hydraulic grade line at the turnout depends on the operation and flow through the Lower Feeder pipeline. Based on observed pressures at the turnout, the hydraulic grade is around 1,075 feet msl.

Turnout WR-33 is connected to the Lower Feeder near Montana Ranch Road. WR-33 delivers raw water to Sierra del Oro (SDO) WTP located on Wilderness Circle via the SDO Raw Booster Station located on Montana Ranch Road. The SDO WTP has a firm treatment capacity of 6 MGD (9.1 MGD Peak). The estimated operating hydraulic grade elevation at this turnout is 1,070 feet msl, based upon the observed inlet pressure of 56 pounds per square inch (psi) and turnout elevation of 940 feet msl.

Turnout WR-24 is connected to the Mill's Pipeline at Temescal Canyon Road and La Gloria Road. The turnout is at elevation 890 feet msl and provides water to the City at a minimum hydraulic grade elevation of 1,380 feet msl. Corona's maximum allotment for this turnout is approximately 6.5 MGD (10 cfs). WR-24 delivers potable water to Zones 3, 4 and 5. Turnout locations and capabilities are summarized in Table 4-3.

Table 4-3
Imported Water Service Connections

Service Connection	Location	Elevation (Ft, msl)	Approx. Hyd. Grade Elev. (Ft, msl)	Max. Capacity (MGD)	Service Zone(s)
WR-19 (Lester WTP Supply)	Chase Dr East of Lester	945	1,075	30	3
WR-33 (SDO WTP Supply)	1670 Montana Ranch Rd West of Green River Rd	940	1,070	9.1	3
WR-24 (Mills Pipeline)	Temescal Cyn Rd at La Gloria Rd	890	1,380	6.5	3, 4, 5

The City also purchases a small amount of water from LLWD through the Mill's Pipeline at the City's Lee Lake connection. This water serves City customers near Weirick Road west of Temescal Canyon Road in the Bedford Subbasin.

The total combined supply capability of imported water is approximately 45.6 MGD (about 31, 666 gpm), which exceeds the estimated ultimate peak hour demand of 33.8 MGD (23,440 gpm). Assuming total capacity and available water, imported water supply could be as high as about 47,000 AFY.

Recent developments have added some uncertainty regarding the reliability of imported water from the State Water Project (SWP). A U.S. District Court decision in May 2007 ruled that the existing 2005 biological opinion for Delta smelt, issued by the U.S. Fish and Wildlife Service (USFWS), did not comply with the federal Endangered Species Act. The biological opinion guides pumping operations for the SWP to ensure no long-term jeopardy to the health and habitat of Delta smelt. The Court ordered certain interim “remedies” or actions to protect endangered fish species until a revised biological opinion is prepared by the USFWS. These remedies collectively amount to cuts in statewide water supply for about one year (Calendar Year 2008). The long-term effect of the court decision is not known, but with these cuts, the availability of SWP water may be impacted, especially during drought cycles. Even though the City relies less on SWP for its imported water supply, these changes may result in increased competition for other imported water supplies.

4.3.3. Recycled Water

The City’s recycled water system will ultimately consist of four service zones, four reservoirs, four booster pump stations, four pressure reducing valves and one surge anticipator valve, a portion of which is currently under construction. The existing recycled water distribution system consists of approximately 180,183 feet of pipe ranging from 4-inches to 24-inches in size. Approximately 31,531 feet of pipe is expected to be added to the system in the future.

The City expects recycled water demand to increase in the future and can currently supply up to 4,200 gpm (about 6,780 AFY). In addition, the source is seen as a reliable supply for recharging the groundwater subbasins to increase yield. Future expansions at the City WWTPs will increase recycled water supply by an additional 7,630 gpm (about 12,310 AFY), bringing the total future capacity to 11,830 gpm (about 19,090 AFY). These expansions will allow for increased recycled water for both irrigation and enhanced groundwater recharge (through basins and/or wells).

5. Basin Management Objectives

The City recognizes the need for more active groundwater management to maintain and protect the resource for reliable water supply. Establishing basin management objectives (BMOs) can provide a clear direction for the implementation of management activities such as pumping distribution and enhanced groundwater recharge. BMOs outline the water level and water quality conditions that are acceptable in the basin, address conditions that need to be remedied, and identify changes in the groundwater basin that need to be avoided. In consideration of the state of the groundwater basin and the water supply goals of the City, the following BMOs are proposed.

5.1. Manage Groundwater Basin in a Sustainable Manner

The City wishes to use groundwater as a long-term reliable supply and recognizes the importance of sustainability. As such, the City supports the operation of the basin such that natural or enhanced recharge can replenish the groundwater extracted on an average basis over time. This management objective recognizes the current overdraft conditions in the subbasins and proposes to adopt management strategies to move toward more sustainable use.

The perennial yield of a groundwater basin is defined as the amount of water that can be extracted on an average basis over time without adverse impacts (Todd and Mays, 2004). Because the term *adverse impacts* is defined on a site-specific basis and may change over time, the perennial yield of a groundwater basin may also change over time. The term *sustainable yield* suggests that a net decline in groundwater storage over some period of time such as an average hydrologic cycle would be an adverse impact and the goal of sustainability is to eliminate such declines. The sustainable yield of a groundwater basin is difficult to define in the absence of reliable, long-term data on all aspects of the water budget. In addition, the sustainable yield is not a fixed amount and can be altered by changes in inflows or outflows to the basin. This GWMP provides preliminary estimates on sustainable yield, but the actual yield will be better defined in the future as changes in operation and improved monitoring concurrently occur.

5.2. Prevent Substantial Water Level Declines in Channel Aquifer

Given the unconfined nature, shallow occurrence, and relatively limited thickness of the Channel Aquifer, water level declines are especially problematic. As water levels drop, the aquifer is de-watered and well yields are adversely affected. Some water level declines can be tolerated during drought conditions if groundwater is sufficiently replenished when recharge is available. As a preliminary operational guideline, the aquifer should be operated to prevent water level declines below about 50 percent of the total aquifer thickness. Assuming an average thickness of about 200 feet, then water levels should be maintained at least 100 feet above the bottom of the aquifer. The bottom of the aquifer is estimated to occur between about 400 to 450 feet msl, so water levels should be maintained above 500 to 550 feet msl across the aquifer. This lower limit is consistent with the range of historical water levels in the area.

5.3. Protect Groundwater Quality in Unconfined Aquifers

The unconfined aquifers on which the City relies are subject to impact from the quality of water infiltrating from the surface. Given the urbanized setting over the Channel Aquifer, this area is especially sensitive to future impact. Once water quality has been compromised, the resource may be subject to loss of use or expensive water treatment processes.

5.4. Maintain Required Outflow at Prado Dam

The stipulated judgment in *Orange County Water District vs. City of Chino, et al.* (1968) requires the City to contribute a baseflow of 1,625 AFY (adjusted for water quality) to the Santa Ana River. Depending on water quality the amount may be as high as 2,240 AFY (Boyle, 2001). Current subbasin outflow is significantly more than required, but basin management activities may reduce the total amount. The City wants to ensure that the required outflow continues to be provided in compliance with the judgment.

5.5. Monitor Groundwater Levels, Quality, and Storage

In order to continue to analyze current groundwater conditions and track changes in the groundwater basin resulting from active management activities, the City would like to expand and improve their monitoring program. The monitoring program would improve the understanding of groundwater level fluctuations, potential impacts to groundwater quality, and changes in groundwater storage across the three subbasins of interest.

6. Basin Management Strategies

6.1. Identification of Management Strategies

The following groundwater management strategies have been identified as having potential for improving the management of the groundwater basins. The 24 strategies have been grouped into seven categories involving similar facilities or locations, and are numbered for easy reference. The eight categories of management strategies are listed below:

- New and Replacement Water Supply Wells and Wellhead Treatment
- Groundwater Treatment Process Improvements
- Groundwater Monitoring Program
- Enhanced Groundwater Recharge
- Expanded Use of Recycled Water
- Use of Imported Water
- Wastewater Pond Maintenance
- Coordination with Regulatory Agencies

Specific strategies are listed in Table 6-1 and described in the following text. The strategies are not listed in order of priority. In addition, some strategies overlap those in other categories. For example, injection wells for groundwater recharge are listed as both a strategy for enhanced recharge and a strategy for expanded use of recycled water.

Table 6-1 List of Management Strategies

Management Strategies	
1	New Water Wells
2	Replacement Water Wells
3	Rincon Groundwater Treatment Project
4	Wellhead Treatment for Wells Impacted with VOCs
5	El Sobrante Groundwater Treatment Project
6	Groundwater Treatment Program
7	Groundwater Blending Program
8	Improvement of Groundwater Quantity/Quality Monitoring Program
9	Coldwater Subbasin Enhanced Recharge Project
10	Recharge Basins within the Oak Avenue Detention Basin
11	Recharge Basins within the Main Street Detention Basin
12	Upgradient Injection Wells
13	Recycled Water Injection Wells
14	Recycled Water Zone 3 to Zone 2 Interconnect
15	Recycled Water Zone 4 to Zone 3 Interconnect
16	WWTP2 Upgrade to Tertiary
17	WWTP1A Upgrade to Tertiary
18	Lee Lake Water District Recharge to Bedford Subbasin
19	Use of Recycled Water as In-Lieu Pumping
20	Purchase of Metropolitan Water District In-Lieu Water
21	Pipeline to Convey Metropolitan Water District In-Lieu Water to Border Avenue Recycled Water Reservoir
22	Lincoln and Cota Street Percolation Ponds Maintenance Program
23	Coordinate with Riverside County on Water Quality and Well Construction
24	Coordinate with the Regional Water Quality Control Board on Water Quality
25	Continue and Expand Water Conservation and Demand Management

6.1.1. New and Replacement Water Supply Wells and Wellhead Treatment

Strategies under this category provide for re-distribution of pumping within the Temescal Subbasin aquifers, use of poorer-quality groundwater, capturing a larger percentage of groundwater discharge from the subbasin, and replacing older less-efficient wells. Facilities associated with these strategies include new wells, wellhead treatment, conveyance to the distribution system, and conveyance to brine disposal lines.

1. New Water Wells

In order to more effectively distribute pumping throughout the aquifer, the City is currently planning for the construction of one new water production well every two to three years. These new wells will enhance the City's production of groundwater during drought periods when imported water is limited. Additional wells will also allow for more flexibility in the maintenance of water levels in the Channel Aquifer. Wells will be located to pump within permeable aquifer zones while minimizing well interference. Wells will also be located to capture a portion of groundwater discharge that is currently exiting the groundwater basin, thereby increasing the basin yield.

2. Replacement Water Wells

The State Controller's Office lists the service life of water wells at 30 years. The City has eight water wells that have exceeded the 30-year service life. The City plans for one replacement water well about every three years.

3. Rincon Groundwater Treatment Project (wells plus treatment)

The Rincon project is in an area of historically high nitrate concentrations and the addition of wellhead treatment facilities will allow for expanded use of this poorer quality water. This project is scheduled for fiscal year of 2015-2016 at a projected cost of $15,000,000, reflecting the added costs of groundwater treatment. The proposed location is in the vicinity of Rincon Street and Alcoa. The project will yield 5,000 AFY to the current potable water system. The specific components of the project are three new wells, a raw water pipeline, a treatment process involving selective resins or best available technology (BAT) to reduce nitrate concentrations, a 6,500 sq. ft. building to house the process, a product pipeline, property acquisition, and brine disposal to the Santa Ana Regional Interceptor (SARI) pipeline.

4. Wellhead Treatment for Wells Impacted with Volatile Organic Compounds (VOCs)

Water quality in City Wells 7 and 17 appears to be threatened by groundwater plume(s) containing trichloroethene (TCE) and other VOCs migrating from an industrial area in eastern Temescal Subbasin. The City is evaluating the need to install a granular activated carbon (GAC) system or other groundwater treatment system to mitigate contamination at these production wells. Production here would also provide some containment of the continued migration, but additional data are necessary for a complete evaluation. More complete containment could be accomplished with new, properly-placed production wells in the area. This strategy is proposed as the El Sobrante Groundwater Treatment Project, described below.

5. **El Sobrante Groundwater Treatment Project (wells plus treatment)**

The El Sobrante project would target an area of impacted groundwater quality and, through proven treatment technologies, improve the quality for beneficial use. The project is currently scheduled for fiscal year of 2020-2021 at a projected cost of $20,000,000, reflecting the high cost of groundwater treatment. The proposed location is in the vicinity of Sixth Street and El Sobrante. The project will yield 5,000 AFY to the current potable water system. The specific components of the project are three new wells, a raw water pipeline, a GAC pre-treatment system to reduce TCE in the extracted groundwater, followed by a treatment process which will be selective resins or BAT to reduce nitrates in the groundwater pumped, a 6,500 sq. ft. building to house the process, a product pipeline, property acquisition, and brine disposal to the SARI pipeline.

6.1.2. Groundwater Treatment Process Improvements

Strategies for this category provide for increased treatment capacity to improve the quality of the water supply and the groundwater basin by reducing nitrates and salts in the ambient groundwater. Improving the quality of the water supply reduces the subsequent loading of these constituents in groundwater from wastewater return flows, thereby benefiting the groundwater basin.

6. **Groundwater Treatment Program**

The City currently operates the Temescal Desalter to reduce salts in the City's water supply. Expansion of the groundwater treatment program is needed to maintain long term water quality and usable supply. The amount of treated groundwater can be increased without additional facility expansion at this time.

7. **Groundwater Blending Program**

The City has an on-going nitrate blending program that is closely coordinated with the RWQCB and requirements of the City's salt management plan. Groundwater with elevated nitrate is blended with imported water or groundwater with lower nitrate levels. This allows groundwater extraction to occur in areas of high nitrate levels resulting from historical activities including agriculture.

6.1.3. Groundwater Monitoring Program

The goal of the monitoring program is to support the long-term sustainability and protection of the groundwater resource. The objectives of the monitoring program are to better understand groundwater conditions, monitor the impacts of groundwater use, identify changes to groundwater quality, and evaluate the performance of management actions. The potential need for improved surface water monitoring and subsidence monitoring will also be evaluated.

8. Improvement of Groundwater Quantity/Quality Monitoring Program

The City desires to improve the current groundwater monitoring program to track water levels, groundwater quality, and groundwater storage throughout the subbasins and over time. Improvements involve the addition of dedicated monitoring wells that are not used for groundwater extraction. These wells provide a better representation of basin water levels and are not as influenced by near-well pumping depressions. The program involves the development of specific monitoring protocols including monitoring locations, frequency, measurements, sampling procedures, data management, and quality assurance/quality control measures. Current monitoring program and protocols are summarized in Appendix B with recommendations for future improvements.

6.1.4. Enhanced Groundwater Recharge

In order to increase basin yield and replenish extracted water, an increase in groundwater recharge is needed in all of the subbasins in this GWMP. Strategies for enhancing groundwater recharge involve the use of surface recharge basins, recharge wells, and in-lieu pumping when imported water is available. Sources of recharge water include stormwater, imported water and recycled water. Strategies that are more closely related to recycled water are repeated and expanded in the next section on recycled water.

9. Coldwater Subbasin Enhanced Recharge Project

The City may wish to implement an enhanced recharge project to enhance the quantity and quality of groundwater in the Coldwater Subbasin. Currently the City manages recharge in Coldwater Wash along a reach south of Glen Ivy Road. This enhanced recharge is accomplished through a series of in-stream berms that retain streamflow, allowing for increased percolation. Only high flows during wet years are not captured; these flows have been observed to contribute to local flooding of roads and may represent an opportunity for additional recharge water. The City may wish to work with Riverside County Flood Control District to investigate methods of capturing these additional flows.

In addition to Coldwater Wash, there may be additional drainages where natural recharge could be increased. It is our understanding that runoff from Mayhew Canyon to the south is being diverted and recharged by EVMWD, and additional opportunities for increasing recharge along that drainage may be limited. Some runoff along drainages in the northern subbasin (Anderson, Bixby, and Brown Canyons) may be available for enhanced recharge in the future, but additional analysis is required. These drainages are located in a relatively dense residential area and have been modified for flood control. Enhanced recharge would likely involve diversions to a recharge area rather than in-stream berms.

10. Recharge Basins within the Oak Avenue Detention Basin

The Oak Avenue Detention Basin is a large stormwater basin located at the mountain front near Oak Avenue and Chase Drive. The basin is operated for flood control by RCFCWCD. According to a pilot study conducted by the City (PBSJ, 2004), a recharge basin constructed within the larger detention basin is capable of receiving and percolating about 2,500 AFY. If another similar recharge basin were constructed in the detention basin, recharge could be potentially increased to as much as 4,000 or 5,000 AFY. In addition to optimizing the recharge of stormwater, recycled water or imported water could be conveyed to the detention basin for recharge. The City has had discussions with RCFCWCD in the past about cooperating in a groundwater recharge project. This strategy would require stormwater monitoring and continued coordination with RCFCWCD to ensure compatibility in operation of the facility for both flood control and recharge. Facilities to convey recycled water are described in the recycled water strategies below.

11. Recharge Basins within the Main Street Detention Basin

Another flood control basin, the Main Street Detention Basin, could also be configured for additional groundwater recharge. The detention basin is located near Main Street and Upper Drive and functions to reduce peak flows into the lined channels of the City's stormwater management system. According to a pilot study conducted by the City (PBSJ, 2004), a recharge basin constructed within the larger detention basin is capable of receiving and percolating about 500 AFY. If two additional basins were constructed at the site, the quantity recharged could be tripled to about 1,500 AFY. Implementation of this strategy will require stormwater monitoring and may also involve potential cleanup work within the basin. Similar to the Oak Avenue basin, any evaluation for implementing a recharge strategy at the Main Street basin will require ongoing coordination with RCFCWCD.

12. Upgradient Injection Wells

Enhanced recharge through wells is an option for increasing yield to the groundwater basin. Although exact locations have not yet been determined, recharge would most likely be effective at the upgradient portion of the Channel Aquifer, near the Arlington Gap. Recharge wells would need to be located to minimize interference with inflow from the adjacent Riverside-Arlington Subbasin. Although the inflow has been observed to contain elevated nitrate concentrations, the area represents a major source of recharge water to the Channel Aquifer. Potable water, recycled water, or blended water could be injected into these wells. Specific components at each site would include a well, well head, down-comer pipes, flow metering, supply piping, flow control and pressure reducing valve, and air relief system.

6.1.5. Expanded Use of Recycled Water

The management strategies in this GWMP provide for the expanded treatment and use of recycled water. Given the potential restrictions on imported water and highly variable rainfall patterns in the valley, recycled water may be the most reliable source of water available for management strategies. Strategies within this category involve the expansion of recycled water use in the basin. Currently, recycled water is used for urban irrigation, but the demand is relatively small. These strategies would develop the infrastructure to expand recycled water use for irrigation, which would decrease reliance on the groundwater basin. The infrastructure would also allow the movement of recycled water to areas within the Temescal Subbasin for enhanced groundwater recharge, currently planned through injection wells.

In 2001, the City conducted a Recycled Water Master Plan (Boyle, 2001) to evaluate the potential to expand the direct use of recycled water for non-potable applications such as park irrigation. The study concluded that additional opportunities for recycled water use exist, primarily during the summer months. Current irrigation demand of recycled water is about 5,600 AFY. As this supply is expanded, additional recycled water could provide in-lieu pumping in the summer months and groundwater basin recharge in the winter months. The recycled water strategies that follow are built around this concept.

13. Recycled Water Injection Wells

Recycled water injection wells could be constructed in several areas of the City that meet regulatory requirements for residence time underground prior to extraction. The *Title 22, California Code of Regulations (Division 4, Chapter 3, Section 60320.010, California Department of Public Health)* states: "for a subsurface injection project, all the recycled water shall be retained underground for a minimum of twelve (12) months prior to extraction for use as a drinking water supply, and shall not be extracted within 2,000 feet of a recycled water injection well." The required distance from extraction wells is currently under review and may be revised. This strategy would also need to meet other regulatory requirements including water quality objectives as provided in the DPH draft regulations (California DPH, 2007).

Specific components at each site include a well, well head, down-comer pipes, flow metering, piping and valves that are connected to the adjacent recycled water piping, and a flow control and pressure reducing valve.

14. Recycled Water Zone 3 to Zone 2 Interconnect

A pipeline that connects Zone 3 to Zone 2 would allow conveyance of recycled water to different water storage facilities in the City. Currently, Zone 3 is fed by WWTP3 and is not connected to any potential recharge sites such as the Oak Avenue and Main Street detention basins. Therefore, during wet periods the effluent from WWTP3 is currently unavailable for enhanced recharge to the groundwater basin.

15. Recycled Water Zone 4 to Zone 3 Interconnect

A pipeline that connects Zone 4 to Zone 3 would allow conveyance of recycled water to customers in Zone 4. This would provide more flexibility in using Zone 3 recycled water in Zone 4 rather than conveying Zone 1 or Zone 2 water to Zone 4.

16. WWTP2 Upgrade to Tertiary

The secondary effluent from Wastewater Treatment Plant 2 (WWTP2) is currently conveyed to the Lincoln and Cota percolation ponds. Upgrades could be constructed at WWTP2 that would provide tertiary treatment and disinfection of the secondary effluent and produce Title 22 recycled water. The recycled water from WWTP2 could be connected to the recycled water system distribution at Harrison Street—which is immediately north of WWTP2—or sent to the percolation ponds for recharge.

17. WWTP1A Upgrade to Tertiary

The secondary effluent from Wastewater Treatment Plant 1A (WWTP1A) is currently conveyed to the Lincoln and Cota percolation ponds. Upgrades could be constructed at WWTP1A that would route the flows through the WWTP1 tertiary filters and chlorine contact tank to produce Title 22 recycled water. The recycled water could then be stored in the on-site recycled water reservoir or sent to the percolation ponds for recharge.

18. Lee Lake Water District's (LLWD) Recharge to Bedford Subbasin

This recharge project includes discharging recycled water (tertiary treated and disinfected) produced by LLWD into surface recharge basins or injection wells (exact locations to be determined) in the Bedford Subbasin. This recycled water is currently being discharged to Temescal Wash and is not contributing to groundwater basin storage. Since the groundwater basin ultimately discharges to the wash, surface water flow on an average basis is not expected to be substantially decreased. The source of the recycled water is wastewater from local residential communities that are supplied with imported water of generally higher quality than ambient groundwater. The resulting recycled water typically has lower TDS values than the ambient groundwater. Therefore, the recharge of recycled water will likely have a beneficial water quality impact on the ambient TDS in the subbasin. In addition, both the City and LLWD may need to rely on local groundwater to increase water supply. Enhancing recharge is expected to increase the subbasin yield. A feasibility study of this project including impacts to water levels and water quality is included as Appendix D.

19. Use of Recycled Water as In-Lieu Pumping

The expanded use of recycled water as a substitute for groundwater under certain non-potable applications (such as park irrigation) would have major benefits for groundwater management. This use of recycled water would decrease pumping from the groundwater basin.

Currently, the City provides approximately 5,600 AFY of recycled water for irrigation. In 2001, the City conducted a survey to examine the potential for expanded recycled water use (Boyle, 2001). In that analysis, the engineers concluded that approximately 1,300 acres of parks, golf courses, and other landscape areas could be irrigated with recycled water. The City has a current capacity of about 6,780 AFY, with a current demand of about 5,600 AFY. As system improvements are made and additional recycled water is available, using recycled water to replace groundwater pumping is a viable management strategy. In addition, the sale of recycled water to customers for additional non-potable applications could provide revenue for continued investment in groundwater management strategies.

6.1.6. Use of Imported Water

Imported water has been and continues to be an important source of supply for the City. Water from the Colorado River and State Project Water is available from the Metropolitan Mills filtration plant and delivered to the City through three existing turnouts. These strategies involve the purchase of additional imported water when available for direct use to decrease groundwater basin pumping (in-lieu pumping). Alternatively, imported water may be used for enhanced recharge to the groundwater basin.

20. Purchase of Metropolitan Water District In-Lieu Water

In-lieu purchase water is excess raw water provided to Metropolitan customers at reduced rates. Use of this water will reduce the amount of groundwater pumped from the basin. When Metropolitan offers in-lieu water, the City should purchase it while concurrently reducing groundwater pumping as practicable. The in-lieu purchase water could be: 1) stored in the City's recycled water reservoir(s) for use; 2) stored in the City's recycled water reservoirs(s) and conveyed to spreading basins or injection wells for storage in the groundwater basin; or 3) treated at the City's water treatment plants and used as Title 22 drinking water.

21. Pipeline to Convey Metropolitan Water District (Metropolitan) In-Lieu Water to Border Avenue Recycled Water Reservoir

To convey the in-lieu purchase water to the City's recycled water facilities, a pipeline would need to be constructed from the City's WR-19 turnout (Metropolitan Lower Feeder connection) to the City's Border Avenue recycled water reservoir. In this area, available imported water could also be conveyed to recharge basins at the Oak Avenue Detention Basin. Recharge of imported water would require coordination with regulatory agencies such as the RWQCB and RCFCWCD.

6.1.7. Wastewater Pond Maintenance

This strategy provides for improved percolation of permitted amounts of wastewater into the groundwater basin. It is anticipated that amounts may decrease over time as treatment and use of recycled water is expanded.

22. Lincoln and Cota Street Percolation Ponds Maintenance Program

Regularly scheduled maintenance on the percolation ponds is critically important to optimize pond percolation and minimize losses to evaporation. This percolation provides groundwater recharge and contributes positively to the subbasin water balance. Even if most of this water ultimately leaves the subbasin as rising groundwater, it maintains head in the discharge area, decreasing gradients and the potential outflow of additional groundwater. Based on past monitoring of percolation rates in the ponds, they require maintenance approximately every 3 to 5 years. This consists of removing the fine soil particulates (filter cake) from the pond bottom and sides and hauling the filter cake offsite for approved disposal.

6.1.8. Coordination with Regulatory Agencies

The City maintains positive working relationships with local agencies, but currently has no centralized effort to coordinate with agencies on water quality issues for the protection and enhancement of the groundwater subbasins. The strategies offered below are a starting point for increased communication and action on specific groundwater issues.

23. Coordinate with Riverside County on Water Quality and Well Construction

The County of Riverside Department of Environmental Health (RDEH) conducts programs and services that are beneficial to the local groundwater subbasins (RDEH, 2008). Through the Water Engineering Program, the County handles well permitting for any well constructed in the County including, but not limited to, driven wells, monitoring wells, cathodic wells, extraction wells, agricultural wells, and community water supply wells. They are also responsible for the permitting, inspection, compliance, monitoring, and enforcement of state standards for small water systems in the County. These programs are consistent with and ensure well construction/destruction standards are implemented as developed by DWR. The City wishes to maintain a positive working relationship with the Water Engineering Program to track wells drilled within the subbasins and ensure proper well construction and destruction for the protection of the groundwater resource. Methods of coordination to access the well information at the County will be further explored through communication with Riverside DEH.

The Riverside DEH also conducts programs related to groundwater contamination. Their ongoing Local Oversight Program provides for oversight of the investigation and cleanup of soil and groundwater contamination from unauthorized releases from leaking underground storage tanks (LUSTs). This program is conducted under contract from the State Water Resources Control Board (SWRCB) and compiles regional information on assessment and cleanup efforts.

Information regarding UST cleanup sites and proposed corrective actions are available online and will be accessed periodically by the City to identify areas of concern. If such areas are identified, the caseworker at the County will be contacted for additional information and coordination.

24. Coordinate with the Regional Water Quality Control Board (RWQCB), Santa Ana Region on Water Quality Issues in the Basin

The City will work with the RWQCB to obtain information on groundwater contamination areas that may adversely impact water quality in the City's drinking water wells. This coordination will involve communication with the RWQCB on sites or areas of known or suspected groundwater impacts. This communication can also involve the periodic access of site cleanup lists on the RWQCB websites.

The City will also continue coordination with the RWQCB on monitoring industrial waste discharges to the sanitary sewer through the City's ongoing Industrial Waste Pre-treatment and Source Control Program. As a requirement of this program, quarterly and annual reports are provided to the RWQCB.

6.1.9. Water Conservation and Demand Management

As previously discussed, the City has committed to aggressive steps on water conservation and demand management. A full-time Water Conservation Coordinator has developed and implemented numerous educational programs (including an education center), water wise events and awards, rebate programs, data-based field tests to demonstrate actual water savings, installation of landscape irrigation controllers, and coordinated programs with Metropolitan and WMWD. Although these measures will continue on their established schedules, the City wishes to acknowledge and incorporate these activities into an overall GWMP strategy.

25. Continue and Expand Water Conservation and Demand Management Activities

Numerous programs have been implemented by the City's aggressive water conservation efforts. A rebate program for low-flow toilets and washing machines has been in place for several years. In addition to an extensive education program previously described (Section 4.2), the City is taking aggressive steps to reduce irrigation demand. The City has initiated a program of working directly with homeowners' associations and others on the installation of weather-based irrigation controls (WBIC) on landscape irrigation systems. Two test programs are planned to determine specific water savings for such devices and include a condominium neighborhood in the older part of Corona and a single-family residential neighborhood in an area of newer development. These two tests will provide monitoring data and information on potential water savings and demand reduction for application to other areas.

6.2. Evaluation of Management Strategies using AB3030 Checklist

Water Code Section 10753 provides a list of 12 examples of groundwater basin issues that may be considered in an AB3030 GWMP. These examples serve as a checklist to ensure that major groundwater basin issues are addressed. The issues are listed below, followed by an explanation of the relationship between each issue and the management strategies proposed in this GWMP.

6.2.1. Control of Saline Water Intrusion

The subbasins of interest are located in upland basins away from the coast and are not subject to the typical threat of coastal seawater intrusion. This issue can also include the potential influx of highly mineralized or brackish water from either natural or anthropogenic (human-influenced) sources. However, no highly mineralized influx has been identified to date. Although water entering the Temescal Subbasin through the Arlington Gap has been observed to have elevated nitrate and other minerals, the inflow contains similar water quality to ambient groundwater in the subbasin and is not a significant threat to water quality. In fact, this area has served as the main source of aquifer recharge to the basin.

6.2.2. Identification and Management of Wellhead Protection and Recharge Areas

Wellhead protection and recharge areas have been evaluated in the past and have been further assessed in this GWMP. In 2002, the City conducted an assessment of the vulnerability of their drinking water wells under the California Drinking Water Source Assessment Program (DWSAP). This program, developed by the California Department of Public Health (DPH) (formerly Department of Health Services), delineates the area around drinking water sources, such as wells, through which contaminants might reach the water supply. This assessment identified surface recharge areas in the vicinity of City wells. In addition, the analysis in this GWMP identifies the main areas of subbasin recharge for the aquifers tapped by City wells. These areas include the entire footprint of the unconfined Channel Aquifer, recharge areas along washes and alluvial fans, and areas of subsurface inflow such as Temescal Canyon and Arlington Gap.

Strategies to manage and protect the recharge zones involve coordination with regulatory agencies such as Riverside County DEH and the RWQCB. These agencies are responsible for evaluating impacts to water quality from industrial or commercial activities and leaking underground storage tanks (LUSTs). Strategies 23 and 24 provide for the coordinated management required for protection of water supply. Also, the City's expanded monitoring program (Strategy 8) will allow for better tracking of groundwater conditions in recharge areas.

6.2.3. Regulation of the Migration of Contaminated Groundwater

The RWQCB, Riverside DEH, and other regulatory agencies provide data and information on impacts to groundwater and potential offsite migration of contamination plumes. Strategies 23 and 24 allow for better coordination with regulatory agencies and identification of areas of contaminated groundwater. Strategies 4 and 5 (involving wellhead treatment of wells downgradient of contaminant sources) directly address one area where groundwater contaminated with certain VOCs has been migrating toward water supply wells.

6.2.4. Administration of a Well Abandonment and Well Destruction Program

Through their Water Engineering Program, Riverside DEH requires that a permit be obtained for the abandonment of any well in the County (Riverside DEH, 2008). Guidance for well abandonment procedures are consistent with the standards developed by DWR for drilling and destroying wells in California (DWR, 1991). In addition, the County provides a registry of approved well drillers who are familiar with County regulations and policies. The publication of such a list increases the likelihood that permits and proper well abandonment procedures will be followed. Strategy 23 involves increased coordination with the Riverside DEH Water Engineering Program and well abandonment procedures.

6.2.5. Mitigation of Overdraft Conditions

As indicated by the preliminary water balances for the Temescal and Coldwater subbasins, both areas have experienced overdraft conditions over the Study Period. From 1990 through 2004, Coldwater Subbasin experienced overdraft conditions with an estimated loss of about 20,000 AF of groundwater storage over the 15-year period. However, the water balance indicates that conditions were improving at the end of the Study Period because of decreased pumping rates in the subbasin. The City is working with other subbasin pumpers to control overdraft conditions through pumping limitations. Strategy 9 provides for an evaluation of enhanced recharge in Coldwater Subbasin.

The water balance in Temescal Subbasin indicates that overdraft conditions occurred in the last three years of the Study Period as average pumping increased from about 10,000 AFY to almost 20,000 AFY. Given the uncertainty associated with imported water amounts in the future, the City will need to rely on the groundwater subbasin for a substantial amount of its water supply. This indicates that control of overdraft conditions through pumping limitations alone may be unrealistic. As such, the City is including numerous strategies for managing groundwater while maintaining groundwater production.

Strategies 1 through 3 include new wells that will allow flexibility in pumping distribution and maintenance of water levels. Strategies 10, 11, 12, and 13 provide for enhanced recharge directly into the Temescal Subbasin. Strategies 9 and 18 provide for increased recharge in Coldwater and Bedford subbasins. Strategies 14, 15, and 21 provide the infrastructure necessary for the conveyance of water to recharge facilities. Strategies 19 and 20 provide replacement water sources for a portion of the groundwater demand, potentially decreasing Temescal Subbasin production. Finally, Strategy 8 will allow for increased monitoring of groundwater levels and storage for the tracking of overdraft mitigation.

6.2.6. Replenishment of Groundwater Extracted by Water Producers

For this Study Area, the replenishment of groundwater extracted by pumpers in the basin is the same issue as the mitigation of overdraft conditions discussed above with a focus on Temescal Subbasin. As previously discussed, the replenishment of Coldwater Subbasin can likely be obtained with natural recharge over time if pumping reductions are in place. For Temescal Subbasin, enhanced recharge is more critical given the current and planned reliance on the subbasin for water supply. Strategies 10, 11, 12, and 13 are the most important strategies for replenishment with Strategies 14, 15, and 21 to provide the supporting infrastructure.

6.2.7. Monitoring of Groundwater Levels and Storage

Strategy 8 provides for the adoption of a monitoring program and protocols and a commitment for improved monitoring components in the future. The current monitoring program and protocols are described in Appendix B. Also included are recommendations for future improvements to the program.

6.2.8. Facilitating Conjunctive Use Operations

To provide for the efficient use of all water sources including groundwater, imported water, and recycled water, the City is interested in the construction and operation of several conjunctive use facilities. Strategies 9, 10, and 11 rely on existing detention basins or permeable off-stream sites for conjunctive use of surface water, imported water, and/or recycled water. In particular, Strategies 10 and 11 seem implementable with relatively minimal land acquisition and recharge basin construction costs. Strategies 12 and 13 involve the construction of injection wells that could use imported water or recycled water to replenish groundwater, especially during the winter months when excess water may be available. Collectively, these strategies provide for key conjunctive use facilities to be constructed and operated by the City.

6.2.9. Identification of Well Construction Policies

Since 1949, DWR has been given the responsibility for developing well standards for the purpose of water quality protection (DWR, 1991). Standards for the construction and destruction of water wells were first published in 1968 and updated in 1974 (DWR, 1981). Subsequent amendments to the Water Code required the development of minimum standards for monitoring and cathodic wells in addition to water wells. Bulletin 74-91 sets those standards as minimum requirements by local agencies. A permit filed in the form of a Well Completion Report/Driller's

Log is required by DWR for the drilling or destruction of wells in the State. A permit is also required by Riverside DEH to track wells in the County and ensure adherence to minimum construction standards. The City has not developed their own standards, but requires DWR standards and Riverside DEH standards.

6.2.10. Construction and Operation of Groundwater Contamination Cleanup, Recharge, Storage, Conservation, Water Recycling, and Extraction Projects

Strategies for groundwater management involve each of the components listed in this item with the exception of water conservation, which is being addressed separately by the City as summarized in previous sections of this document and described in the City's Urban Water Management Plan (AKM, December 2005). Strategies 4 and 5 provide for migration control of a VOC plume of contaminated groundwater and mitigation of water quality impacts to City wells. Strategies 9 through 13 and 18 describe recharge projects for increasing groundwater storage. Strategies 13 through 19 address the expanded and efficient use of recycled water. Strategies 1, 2, 3, and 5 provide for more flexibility in groundwater extraction through varying pumping distribution within the aquifer to manage levels and quality.

6.2.11. Development of Relationships with State and Federal Regulatory Agencies

Strategies 23 and 24 specifically address coordination with key regulatory agencies on groundwater management activities. Coordinated management focuses on water quality issues as regulated by the RWQCB and Riverside DEH and well construction/abandonment policies regulated by Riverside DEH and DWR.

6.2.12. Review of Land Use Plans and Coordination with Land Use Planning Agencies to Assess Activities which Create a Reasonable Risk of Groundwater Contamination

The City of Corona is close to build out with little opportunity for major changes to land use planning. Nonetheless, the Department of Water and Power can communicate closely with City planners on the vulnerability of the groundwater resource and protection measures for risk assessment. In the City's General Plan, adopted in March 2004, the City established a goal and related policies to manage urban runoff for protection of groundwater. Policies address the proper handling, storage, application, and disposal of pesticides, insecticides, and similar substances. Policies also address stormwater management and reuse and BMPs from construction.

6.3. Evaluation of Management Strategies

Several of the identified groundwater management strategies were evaluated with the groundwater flow model constructed as part of this GWMP. The evaluation and results are discussed in the following sections. Details on model construction, calibration, and setup for application of the management strategies are provided in Appendix C. Figures C-11 through C-14 summarize changes in water levels in the target wells associated with the baseline evaluation and management strategies as described in the sections below.

6.3.1. Baseline Evaluation

To provide a baseline against which to measure groundwater management strategies, a baseline model run was developed that accounts for a total demand at build out of about 51,631 AFY. As previously discussed, the City has a tentative target for obtaining one-half of the demand from the groundwater subbasins, or a total pumping amount of 25,816 AFY. The Coldwater Subbasin appears capable of providing at least 3,500 AFY (equal to the City's 2007 pumping). Pumping in Bedford Subbasin could potentially provide another 600 AFY, leaving a demand of about 21,700 AFY from the Temescal Subbasin. Additional details of the baseline scenario are provided in Appendix C.

Modeling indicates that baseline pumping results in average water level declines of about 30 to 50 feet in the main portions of the Channel Aquifer over the simulation period. These declines would result in dewatering of more than 50 percent of the aquifer thickness in some wells, substantially decreasing well capacity.

The decline also represents a substantial loss of groundwater in storage in the unconfined aquifer. A summary of the average water budget components under baseline conditions is provided in Table 6-2.

Table 6-2
Baseline Evaluation Water Balance (AFY)

INFLOWS	Ave.
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**479**
Recharge from Wastewater Discharge	**8,504**
Subsurface Inflow Subtotal	**5,163**
- Arlington Gap	4,182
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	816
- Norco	52
Return Flows Subtotal	**2,542**
TOTAL INFLOWS (AFY)	**18,377**
OUTFLOWS	
Groundwater Pumping	**21,722**
Subsurface Outflow to Santa Ana River	**5,481**
TOTAL OUTFLOWS (AFY)	**27,203**
Change in Storage	**-8,826**

Values above represent average conditions over a 15-year model simulation period. The complete baseline simulation is summarized in Table C-3 in Appendix C. The groundwater basin water budget shown above indicates that under hydrologic conditions similar to the Study Period, an average decline in groundwater storage of about -8,826 AFY would be expected (subtract outflows of 27,203 AFY from inflows of 18,377 AFY). According to this analysis, pumping under the baseline scenario is unsustainable without additional management strategies to increase basin yield or reduce groundwater production.

6.3.2. Scenario 1 - Pumping Redistribution

To evaluate the impact of redistributing pumping within the Channel Aquifer, two new downgradient wells were simulated in this model run. The new wells were positioned to potentially intercept subbasin outflow to the Prado Management Area and were assigned a pumping amount of 2,500 AFY for each well. The baseline pumping total was maintained and pumping amounts were systematically decreased in current production wells to account for the added production in the new wells.

The water budget from this model run is summarized in Table 6-3. As shown in the table, the outflows are similar to the baseline simulation, but inflows have decreased (compare 18,377 AFY in Table 6-2 to 18,122 AFY in Table 6-3). As such, the average storage decline of -9,095 AFY is slightly worse than under baseline conditions due to the slight decrease in inflow from Arlington Gap. This occurred because decreased pumping in upgradient wells resulted in rising water levels and decreasing gradients across the gap. In addition, the new pumping was not sufficient to decrease basin outflow, which resulted in almost the same average outflow total as simulated under baseline conditions (compare outflows in Table 6-3 to Table 6-2). Annual results from the Scenario 1 simulation are provided in Appendix C in Table C-4.

Table 6-3
Scenario 1
Pumping Redistribution Water Balance (AFY)

INFLOWS	
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**479**
Recharge from Wastewater Discharge	**8,504**
Subsurface Inflow Subtotal	**4,908**
- Arlington Gap	3,901
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	842
- Norco	52
Return Flows Subtotal	**2,542**
TOTAL INFLOWS (AFY)	**18,122**
OUTFLOWS	
Groundwater Pumping	**21,742**
Subsurface Outflow to Santa Ana River	**5,475**
TOTAL OUTFLOWS (AFY)	**27,217**
Change in Storage (AFY)	**-9,095**

Although the decline in storage was greater, Scenario 1 was successful at increasing water levels in most target wells from baseline conditions (see Figures C-11 through C-14 in Appendix C). By the end of the 15-year simulation period, water levels had risen an average of about 10 feet in key wells. This is expected, given that most of the calibration targets are active pumping wells and any decrease in pumping will result in a rise in water levels. Nonetheless, this simulation suggests the water levels can be maintained on a short-term basis through redistributions in pumping.

Several additional model simulations were conducted with additional downgradient pumping wells to capture basin outflow to the Prado Management Area. Results of these runs are not included in the GWMP, but indicated that substantial increases in pumping just upgradient of the Prado Management Area were not capable of capturing large percentages of the outflow. It is not clear whether boundary conditions limit the model's ability to simulate the capture of outflow or whether most of the outflow is not occurring near the area of simulated wells. Additional analyses will be required to further evaluate the optimal location and number of wells for decreasing outflow and increasing basin yield.

6.3.3. Scenarios 2 and 3 - Enhanced Recharge at Detention Basins

As previously discussed, pilot testing conducted by the City at the Oak Avenue and Main Street detention basins noted high infiltration rates and indicated that up to about 6,500 AFY could be recharged with construction of spreading basins within each larger detention basin (about 5,000 AFY in Oak Avenue Basin and about 1,500 AFY in Main Street Basin). The source of the recharge water would most likely be a combination of recycled water and stormwater. Imported water could also be used if available. Since current draft regulations regarding the recharge of recycled water call for dilution with another source, a combination of source waters will likely be needed. Actual implementation of this strategy would require coordination with regulatory agencies, including RCFCWCD, monitoring, and in-basin cleanup.

For simulation in the groundwater model, it is assumed that one-half of the recharge water is from water available only during the wet season. Recycled water is recharged year-round in the simulation. Recharge at the two basins was simulated separately for evaluation. Baseline pumping was used. Wastewater discharge to percolation ponds was slightly decreased reflecting the use of recycled water. Details of the simulations are provided in Appendix C.

The results of the model water budgets are summarized in Tables 6-4 and 6-5 for the Oak Avenue Detention Basin and Main Street Detention Basin recharge scenarios, respectively. Both scenarios show less groundwater storage declines than baseline scenarios because of the increase in inflows, equivalent to the amount of recharge assigned to each scenario. Because a larger volume of water was recharged at Oak Avenue, that scenario shows the most improvement. Declines in groundwater storage were -4,309 AFY and -6,562 AFY for Oak Avenue and Main Street basin recharge, respectively. This compares to the average decline in groundwater storage of -8,826 AFY under baseline conditions. Annual results for the two simulations are provided in Appendix C on Tables C-5 and C-6.

In general, water levels did not respond significantly to the smaller amount of recharge in the Main Street Detention Basin over a 15-year simulation period. Water levels rose about 16 feet on the alluvial fan in response to the larger recharge amounts in the Oak Avenue Detention Basin. In addition, water levels also rose several feet in the Channel Aquifer under this scenario. Water level hydrographs in target wells are provided in Appendix C.

Table 6-4
Scenario 2
Recharge at Oak Avenue Basin Water Balance (AFY)

INFLOWS	
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**5,246**
- Oak Street	5,006
- Main Street	240
Recharge from Wastewater Discharge	**8,214**
Subsurface Inflow Subtotal	**5,199**
- Arlington Gap	4,192
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	842
- Norco	52
Return Flows Subtotal	**2,542**
TOTAL INFLOWS (AFY)	**22,890**
OUTFLOWS	
Groundwater Pumping	**21,718**
Subsurface Outflow to Santa Ana River	**5,481**
TOTAL OUTFLOWS (AFY)	**27,199**
Change in Storage (AFY)	**-4,309**

Table 6-5
Scenario 3
Recharge at Main Street Basin Water Balance (AFY)

INFLOWS	
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**1,743**
- Oak Street	240
- Main Street	1,502
Recharge from Wastewater Discharge	**9,507**
Subsurface Inflow Subtotal	**5,161**
- Arlington Gap	4,154
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	842
- Norco	52
Return Flows Subtotal	**2,542**
TOTAL INFLOWS (AFY)	**20,642**
OUTFLOWS	
Groundwater Pumping	**21,722**
Subsurface Outflow to Santa Ana River	**5,481**
TOTAL OUTFLOWS (AFY)	**27,204**
Change in Storage (AFY)	**-6,562**

6.3.4. Scenarios 4a and 4b - Upgradient Injection Wells in Channel Aquifer

Currently, 5 MGD to 10 MGD could be dedicated to a recharge well project during the wet season (2,762 AF to 5,524 AF over six months). Assuming an injection well capacity of about 1,000 gpm, approximately four wells to seven wells would be needed for the recharge of recycled water. As such, two scenarios were evaluated in the groundwater model: four wells recharging 2,762 AFY and seven wells recharging 5,524 AFY (with recharge occurring over a six month period). Wastewater discharge is also decreased to reflect the treatment of additional wastewater for recycled water production. To provide benefits to downgradient wells, the preliminary location selected for the injection wells was the most upgradient position in the Channel Aquifer, near Arlington Gap. Additional details on the simulation of the injection wells are provided in Appendix C.

The results of the scenarios are summarized by the model water budgets presented in Tables 6-6 and 6-7. (Annual results are provided in Appendix C on Tables C-7 and C-8). In both cases, the average subbasin inflows are higher than estimated for baseline conditions, reflecting the increased recharge. As shown in the tables, total inflows are estimated at 20,987 AFY and 21,068 AFY for the injection well scenarios compared to average inflows of 18,377 AFY for the baseline scenario. However, the increase in inflows was not equivalent to the amount of recharge added because of decreases in other inflow totals including less subsurface inflow at Arlington Gap. The locations of the injection wells create water level rises near the gap and block a certain portion of the inflow. Additional evaluation is necessary to optimize the location of the injection wells. Nonetheless, the storage decline associated with these two scenarios is less than under baseline conditions. Water level hydrographs showing the change in water levels at the end of the 15-year simulation period for both injection well scenarios (Scenarios 4a and 4b) are provided in Figures C-11 through C-14 in Appendix C.

Table 6-6
Scenario 4a
Recharge near Arlington Gap (4 wells) Water Balance (AFY)

INFLOWS	
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**479**
Recharge from Wastewater Discharge	**9,390**
Subsurface Inflow Subtotal	**4,125**
- Arlington Gap	3,131
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	833
- Norco	48
Return Flows Subtotal	**2,542**
Recharge Wells at Arlington	**2,762**
TOTAL INFLOWS (AFY)	**20,987**
OUTFLOWS	
Groundwater Pumping	**21,717**
Subsurface Outflow to Santa Ana River	**5,481**
TOTAL OUTFLOWS (AFY)	**27,199**
Change in Storage (AFY)	**-6,212**

Table 6-7
Scenario 4b
Recharge near Arlington Gap (7 wells) Water Balance (AFY)

INFLOWS	
Deep Percolation from Precipitation	**1,689**
Infiltration of Runoff in Detention Basins	**479**
Recharge from Wastewater Discharge	**7,988**
Subsurface Inflow Subtotal	**2,846**
- Arlington Gap	1,839
- Temescal Wash (Temescal Canyon)	113
- Bedrock in Watershed	842
- Norco	52
Return Flows Subtotal	**2,542**
Recharge Wells	**5,524**
TOTAL INFLOWS (AFY)	**21,068**
OUTFLOWS	
Groundwater Pumping	**21,715**
Subsurface Outflow to Santa Ana River	**5,481**
TOTAL OUTFLOWS (AFY)	**27,195**
Change in Storage (AFY)	**-6,127**

In addition to improving changes in groundwater storage, these two recharge scenarios also benefit water levels throughout the Channel Aquifer. Water levels rose more than 25 feet in some upgradient areas near the injection wells. As expected, water levels rose more in upgradient wells, but even some downgradient wells recorded water level rises of about 8 feet over baseline conditions (Figures C-11 through C-14, Appendix C).

In summary, the management strategy of recharge wells improved water levels and water budgets, but decreased Arlington Gap inflow. Recharge wells offer the best potential for direct and immediate recharge to the Channel Aquifer, but additional evaluation will be necessary to determine optimal locations and number of wells.

6.3.5. Recycled Water Recharge

As described in the management strategies above, enhanced recharge will be needed for management of the groundwater subbasins. Given recent uncertainties in the reliability of SWP and other sources of imported water, recycled water may be the City's most reliable supplemental supply for groundwater recharge. To ensure that groundwater quality is not adversely impacted from the recharge of recycled water, a preliminary review of 2007 recycled water quality data was conducted. Prior to implementation, recycled water recharge projects will be further evaluated to ensure compliance with recharge regulations and permit requirements.

Water quality data from the 2007 monitoring program was compared against the primary and secondary MCLs for regulated compounds relevant in draft recycled water recharge regulations (California DPH, 2007). Because the City is not currently recharging recycled water, not all of the regulated constituents have been analyzed to date. In particular, radionuclides and an expanded list of organic chemicals will be analyzed as recycled water recharge is further evaluated. Additional unregulated constituents may also require analysis.

A review of the 2007 monitoring data demonstrates that all but one constituent (TDS) analyzed in the City's recycled water already meet relevant regulatory standards. The recycled water TDS concentration of 650 mg/L does not meet the secondary recommended MCL of 500 mg/L, but is significantly below the maximum permitted of 1,000 mg/L. Because the City's wastewater is a blend of groundwater and imported water (with lower TDS), the concentration of TDS in wastewater is generally lower than in groundwater, resulting in a benefit to the subbasin. DPH regulations allow recharge of TDS concentrations higher than 500 mg/L under certain conditions. Final permitted levels will be determined as the project moves forward.

Only one regulated organic compound, chloroform, has been detected in the City's recycled water. This chemical is typically formed as a disinfection byproduct after chlorination has been used to ensure extinction of microbial pathogens. The compound was detected at only a trace value and is more than two orders of magnitude below the MCL. Given the data reviewed to date, the recharge of recycled water is not anticipated to adversely impact groundwater quality.

6.4. Recommended Management Strategies

As indicated in the evaluations above, no single strategy will achieve BMOs. A combination of strategies will be required, especially those supporting enhanced recharge and in-lieu pumping. Without management strategies, the groundwater subbasins will not be sustainable at the pumping rates identified as being needed at build out. Management strategies will be conducted in concert with continued water conservation strategies to manage demand.

7. Implementation Plan

In development of an implementation plan for the management strategies identified, issues such as funding opportunities, budgeting, and need are considered. Several of these programs are ongoing and are required for continued operation of the water supply. In addition, several of the strategies rely on the implementation of other strategies. Information on the prioritization of projects and the implementation are provided below.

7.1. Prioritization of Strategies

Given the results of the water balance and the need for increased groundwater development, the highest priority for groundwater management are strategies that provide for enhanced recharge (or in-lieu pumping) in the groundwater basin. The best use for imported water at this time seems to be direct use, especially if the availability allows for an offset in pumping. The most reliable supply for recharge is likely to be recycled water. However, for the expanded use of recycled water, additional conveyance and infrastructure improvements are required, namely, Strategies 14 and 15 (Interconnect Recycled Water Zone 3 to Zone 2 and Interconnect Recycled Water Zone 4 to Zone 3).

7.2. Implementation Plan and Schedule

Capital improvement projects and corresponding implementation schedule are summarized in Table 7-1. These projects, designated C-1, C-2, etc., correspond directly to the strategies described in Chapter 6 (C denotes a capital improvement project). The remaining management strategies not listed in Table 7-1 include Strategy 19 (Use of Recycled Water as In-Lieu Pumping), 23 (Coordination with Riverside DEH), and 24 (Coordination with RWQCB). The coordination efforts will begin immediately and build on current relationships with the agencies. Strategy 25 (Water Conservation and Demand Management) is ongoing and will continue as a coordinated effort with the City's Water Conservation Coordinator. The use of recycled water as in-lieu pumping (Strategy 19) is also ongoing and will be expanded as additional markets are identified.

Table 7-1
Implementation Plan and Schedule

Project Number	Project Description	Annual Water Yield (AF)	Project Cost	Year
C-1	New Water Wells	1,935	$1,500,000/ well	On-going
C-2	Replacement Water Wells	1,935	$1,500,000/ well	On-going
C-3	Rincon Groundwater Treatment Project	5,600	$15,000,000	2015
C-4	Wellhead Treatment for Wells 6, 7, and 17	4,800	$10,000,000	2012
C-5	El Sobrante Groundwater Treatment Project	5,600	$20,000,000	2020
C-6	Groundwater Treatment Program	3,800	$3,000,000	2011
C-7	Groundwater Blending Program	1,800	$600,000	2010
C-8	Improvement of Groundwater Quantity/Quality Monitoring Program	0	$50,000	2010
C-9	Coldwater Subbasin Enhanced Recharge Project	2,000	$100,000	2011
C-10	Recharge Basins within Oak Avenue Detention Basin	5,000	$2,300,000	2010
C-11	Recharge Basins within Main Street Detention Basin	1,500	$690,000	2012
C-12	Upgradient Injection Wells	4,800	$5,000,000	2009
C-13	Recycled Water Injection Wells	4,500	$4,600,000	2011
C-14	Recycled Water Zone 3 to Zone 2 Interconnect	1,800	$4,800,000	2009
C-15	Recycled Water Zone 4 to Zone 3 Interconnect	3,000	$2,400,000	2009
C-16	WWTP2 Upgrade to Tertiary	3,300	$9,500,000	2010
C-17	WWTP1A Upgrade to Tertiary	1,100	$2,100,000	2012
C-18	Lee Lake Water District Recharge to Bedford Subbasin	80	$500,000	2010
C-20	Purchase of Metropolitan Water District In-Lieu Water	Unknown	Unknown	As Available
C-21	Pipeline to Convey Metropolitan Water District In-Lieu Water to Border Avenue Recycled Water Reservoir	Unknown	Unknown	As Available
C-22	Lincoln and Cota Street Percolation Ponds Maintenance Program	1,000	$100,000/ every 3-5 years	On-going

7.3. Annual Re-evaluation of Management Performance

The implementation of groundwater management strategies and the performance of management activities will be reviewed on an annual basis. A close assessment of the basin response to operational changes and pumping re-distribution among existing wells will provide additional information on management. Ongoing improvements to the monitoring network will also allow for a more detailed evaluation of groundwater levels, quality, and storage.

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Figures

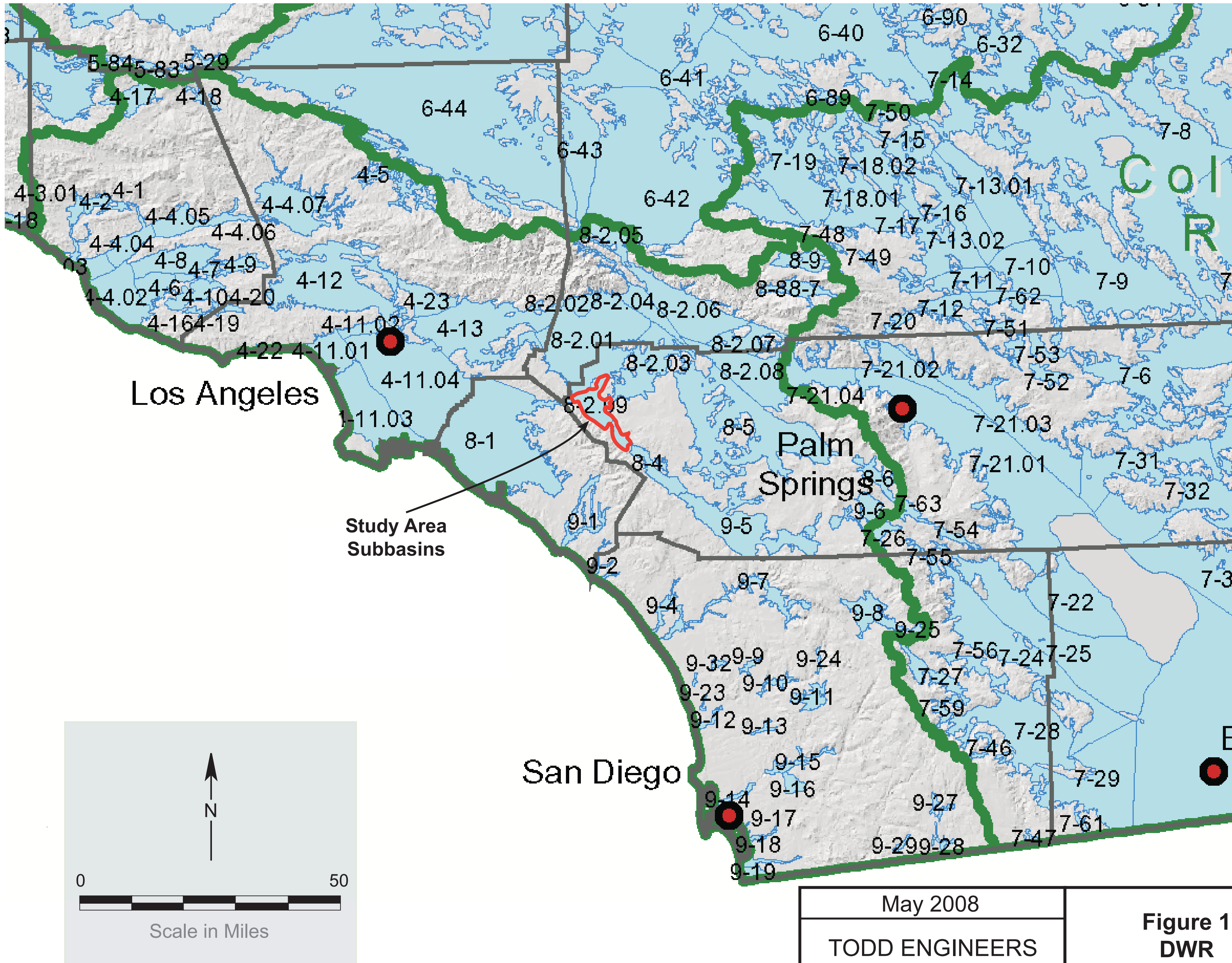

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Figure 1
DWR
Groundwater Basins

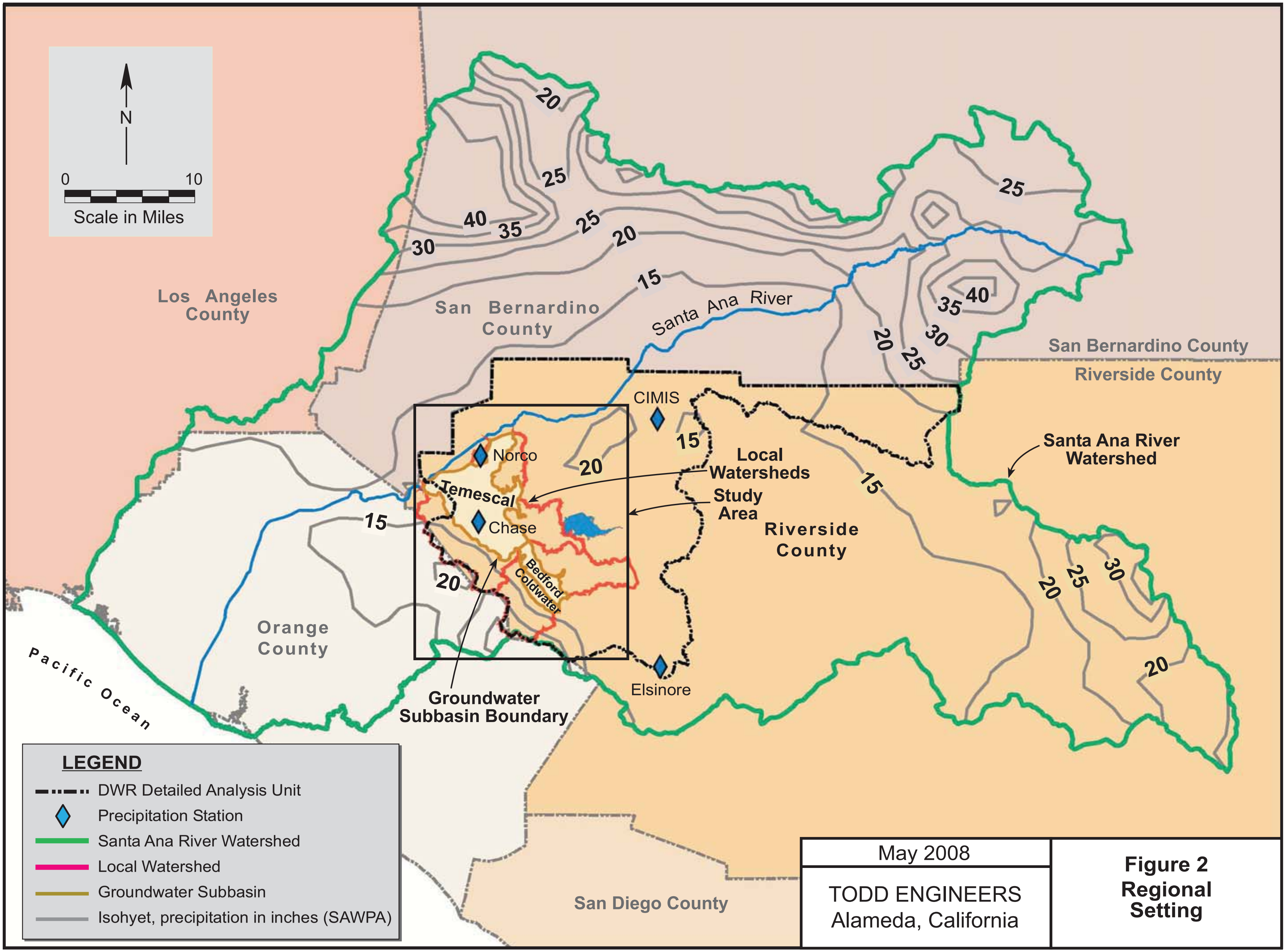

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Figure 2
Regional Setting

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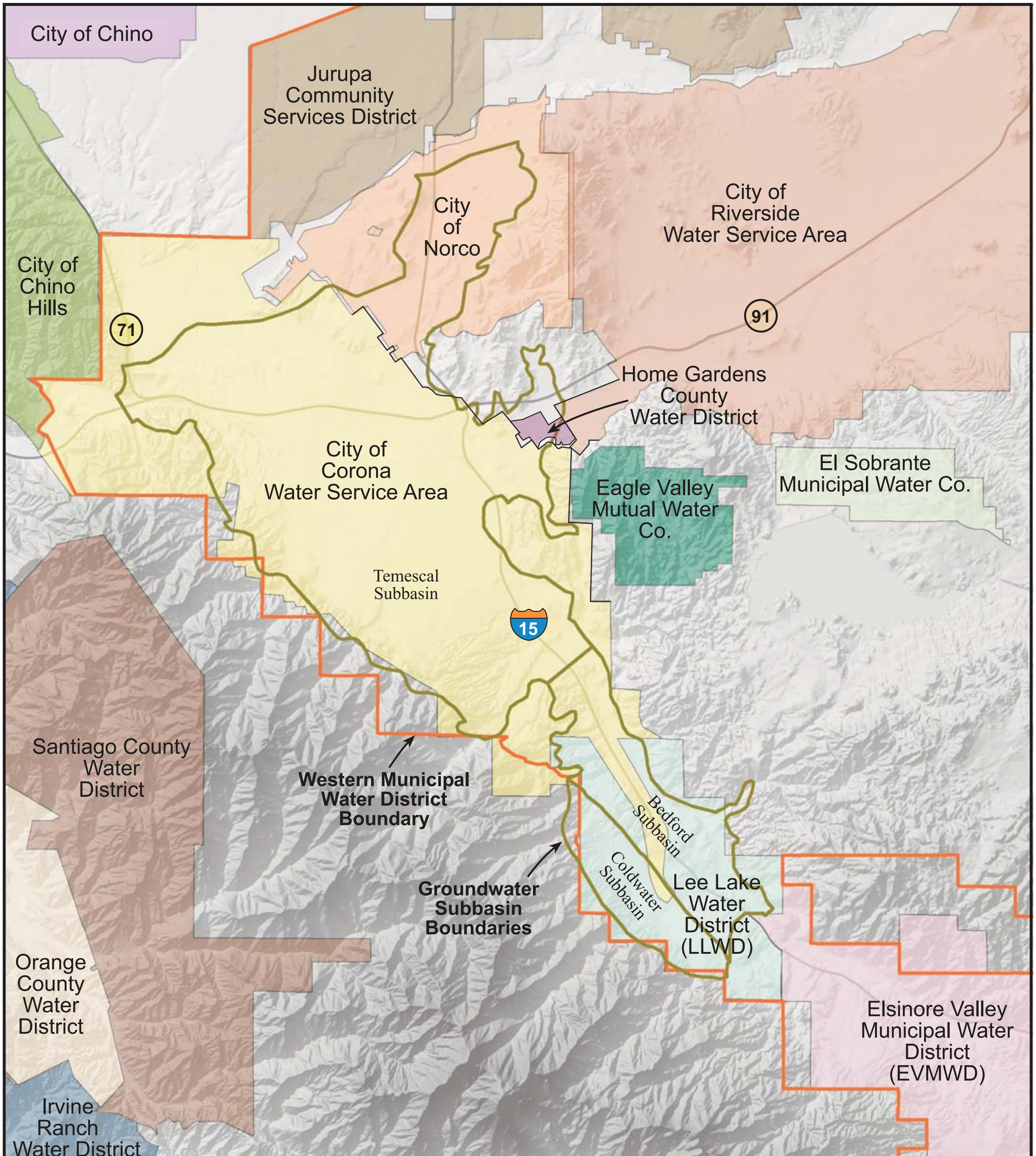
Figure 3
Study Area



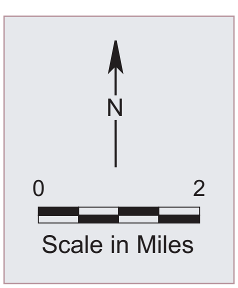


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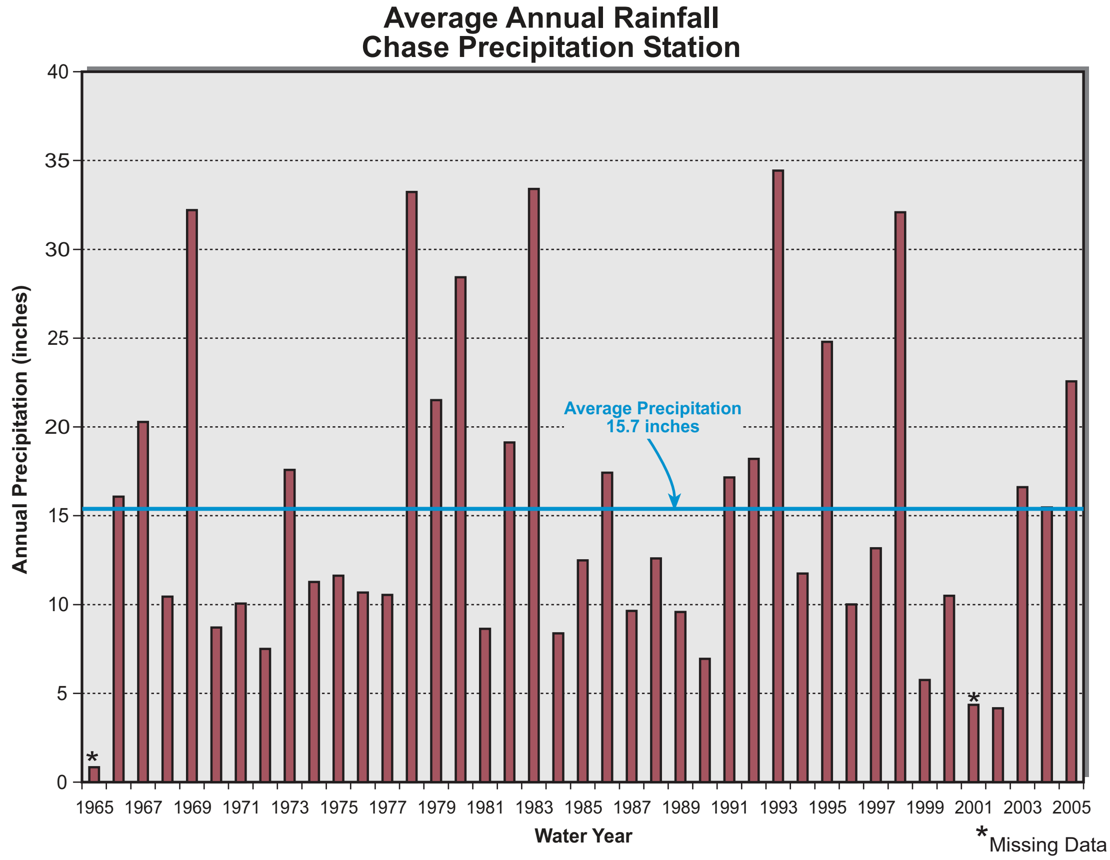
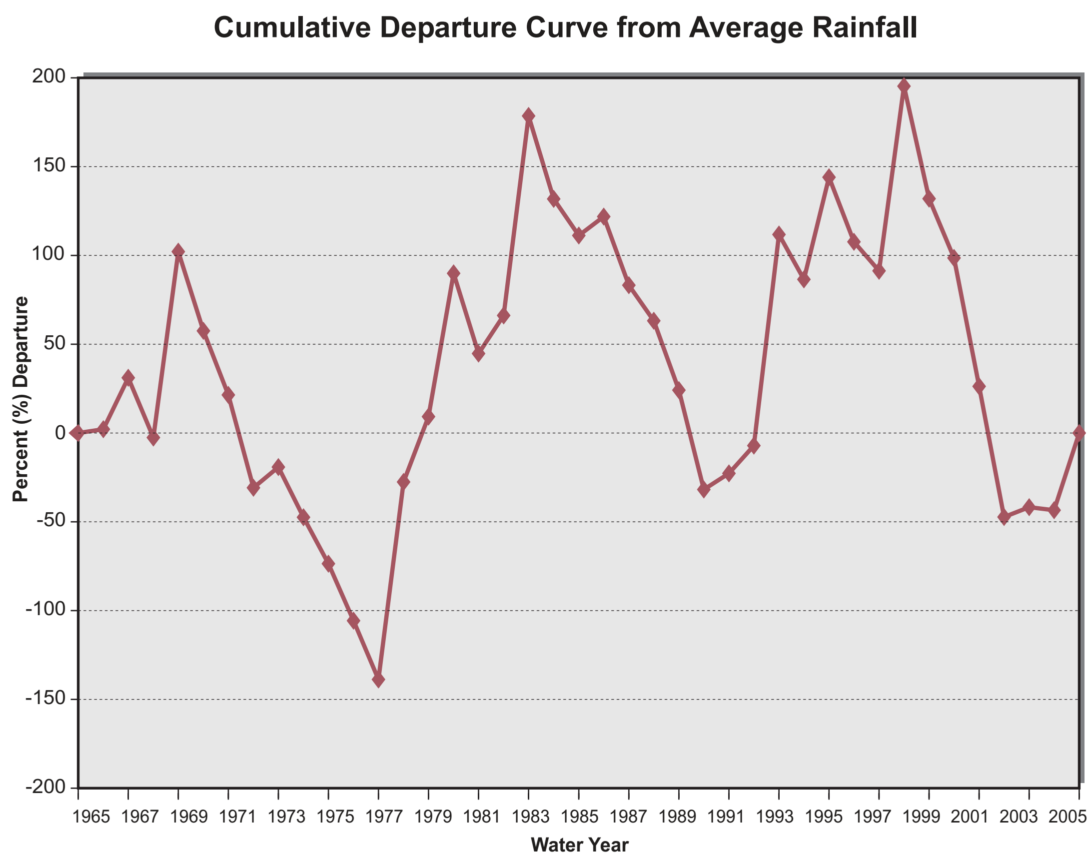
Figure 4
Water Agencies





May 2008	**Figure 5** **Precipitation and Cumulative Departure Curve**
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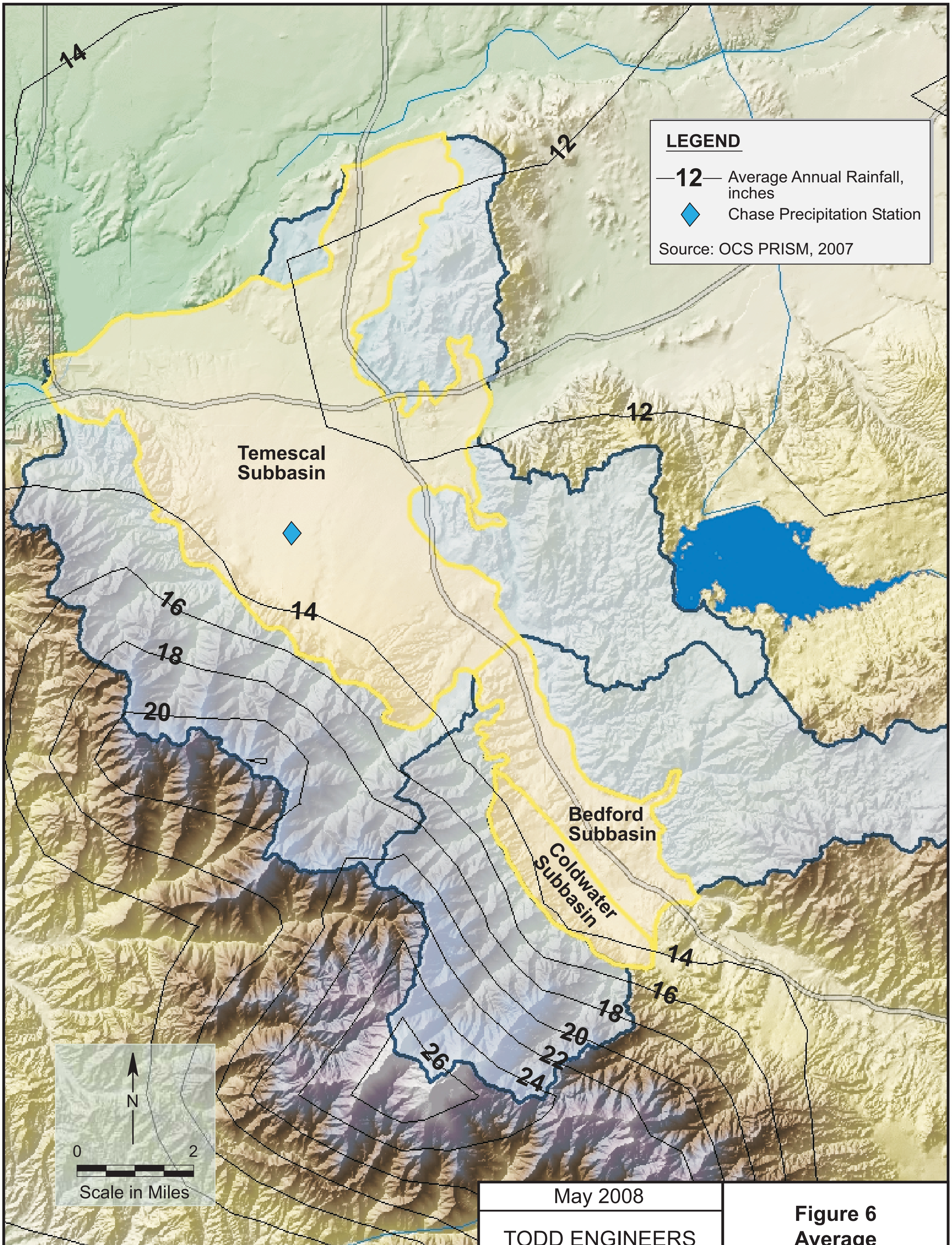

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Figure 6
Average Annual Rainfall

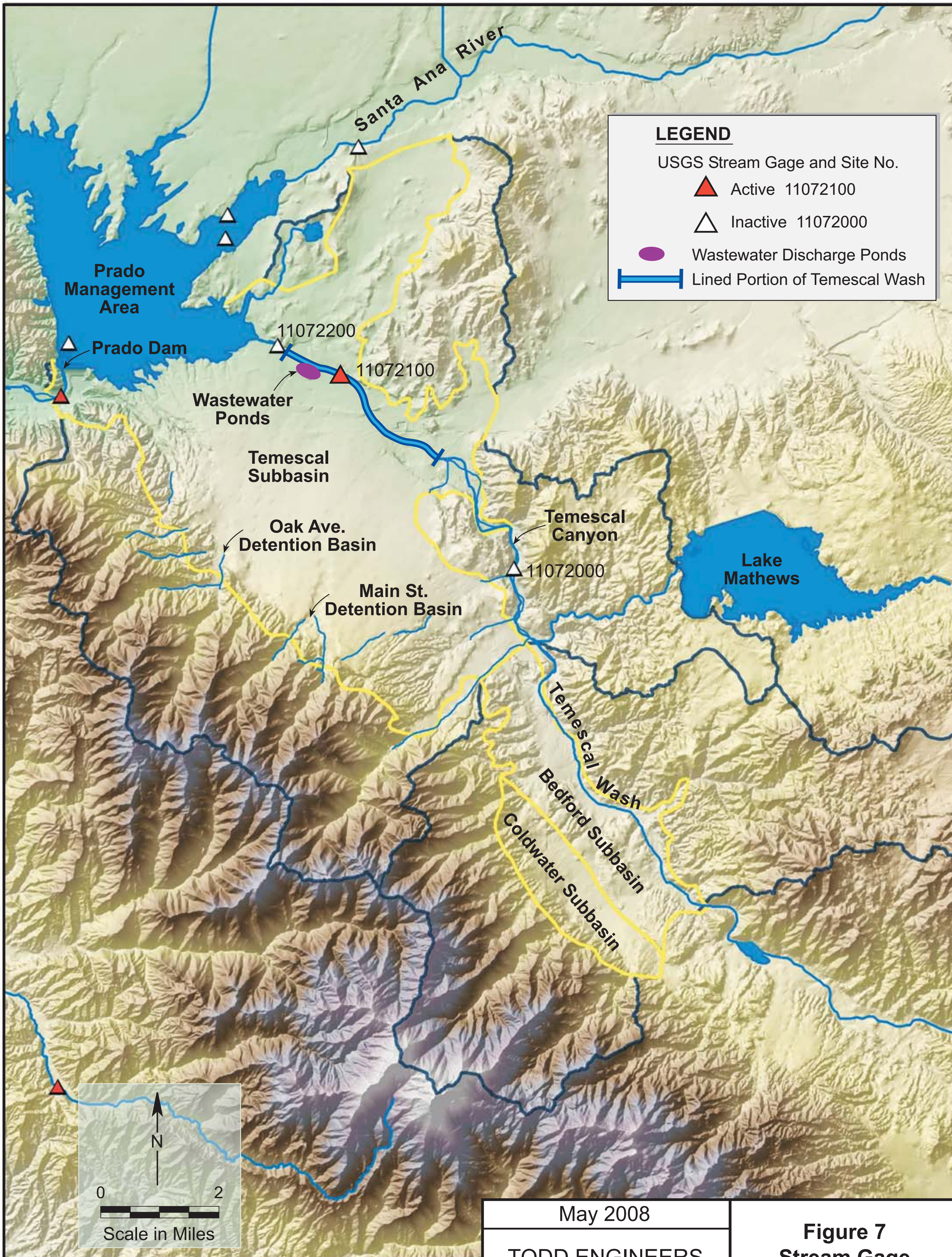

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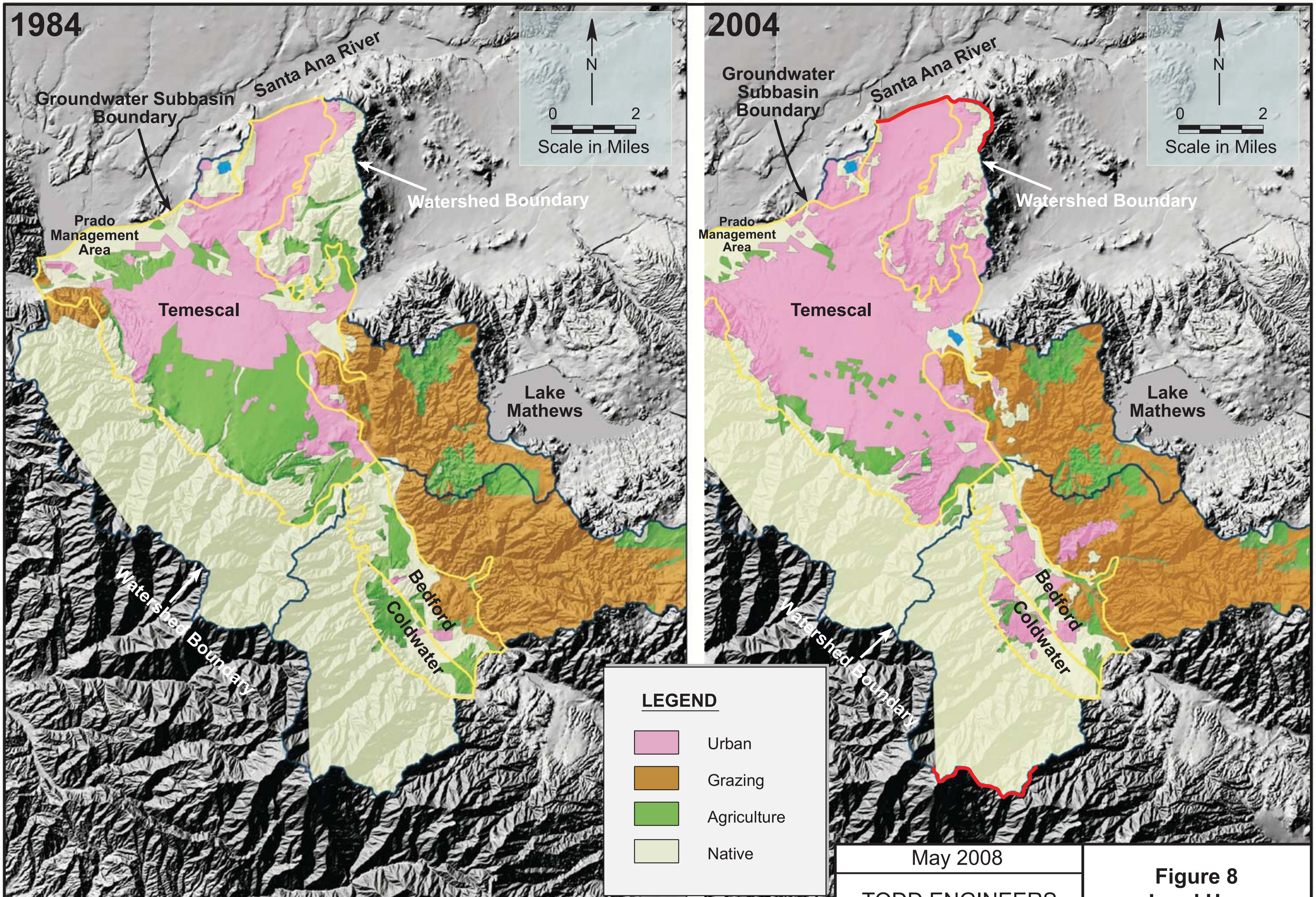
Figure 7
Stream Gage Locations



Source: DWR, July 2006.

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Figure 8
Land Use
1984 and 2004

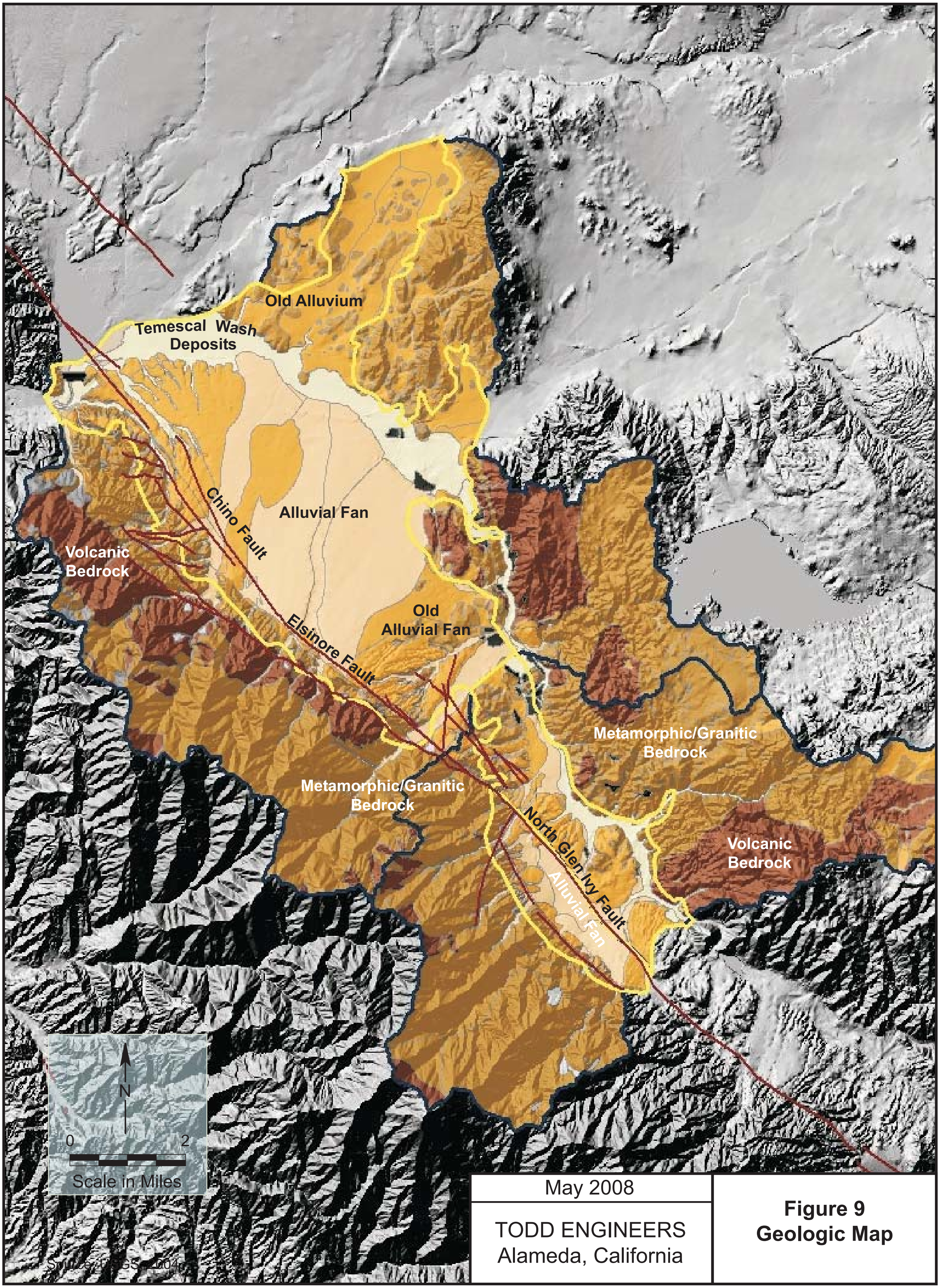

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Figure 9
Geologic Map

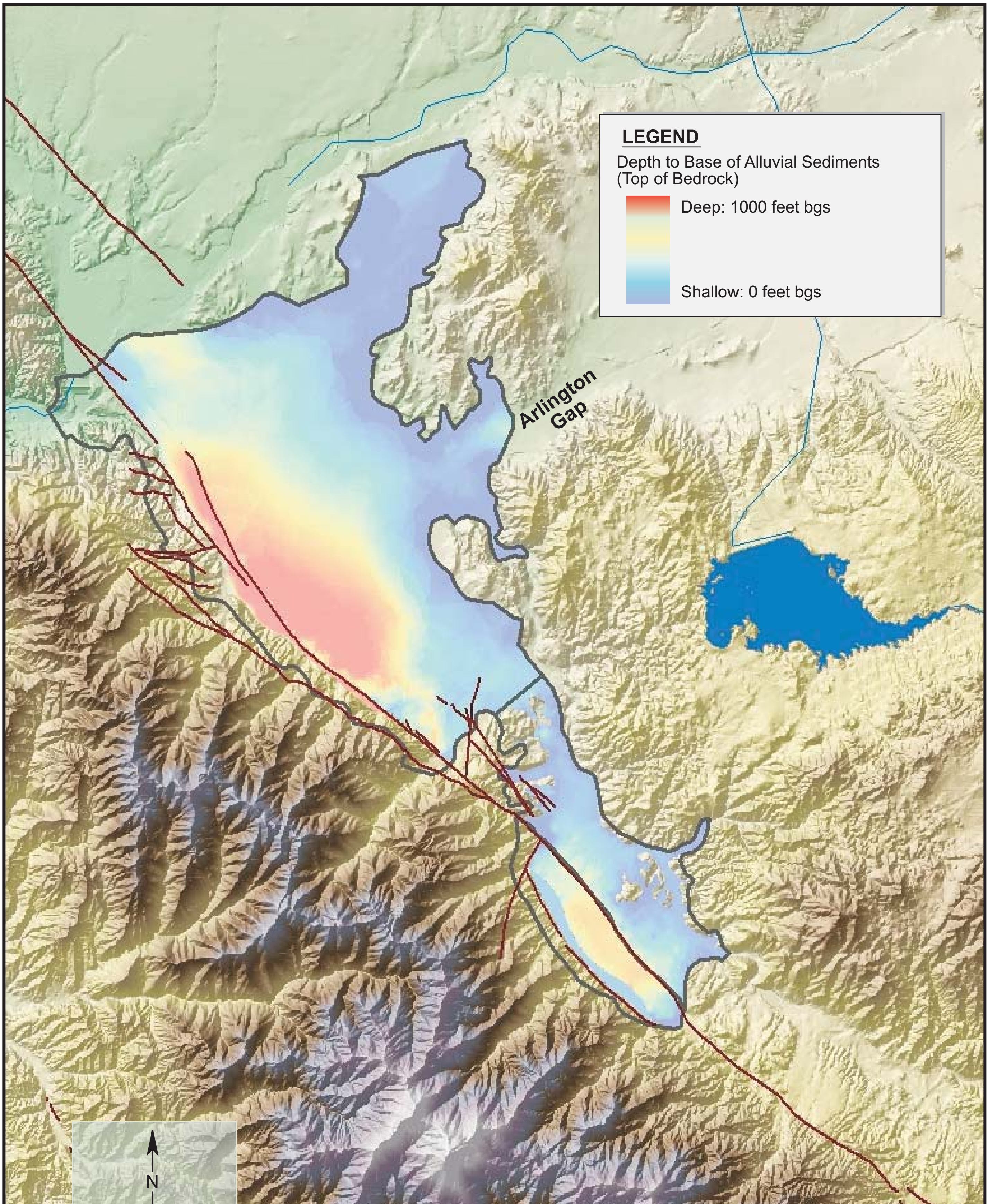

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Figure 10
Basin Geometry - Depth to Bedrock

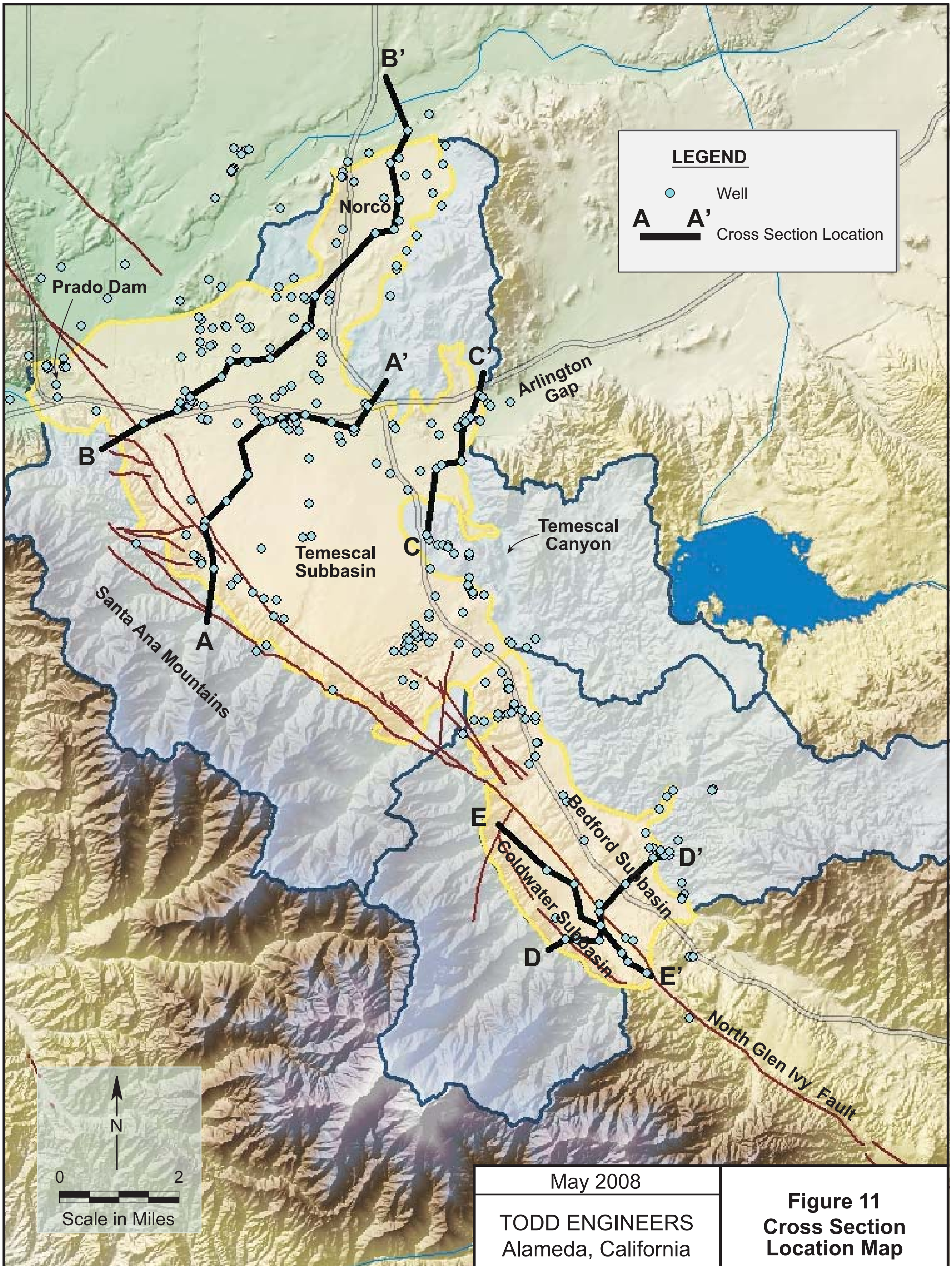

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Figure 11
Cross Section Location Map

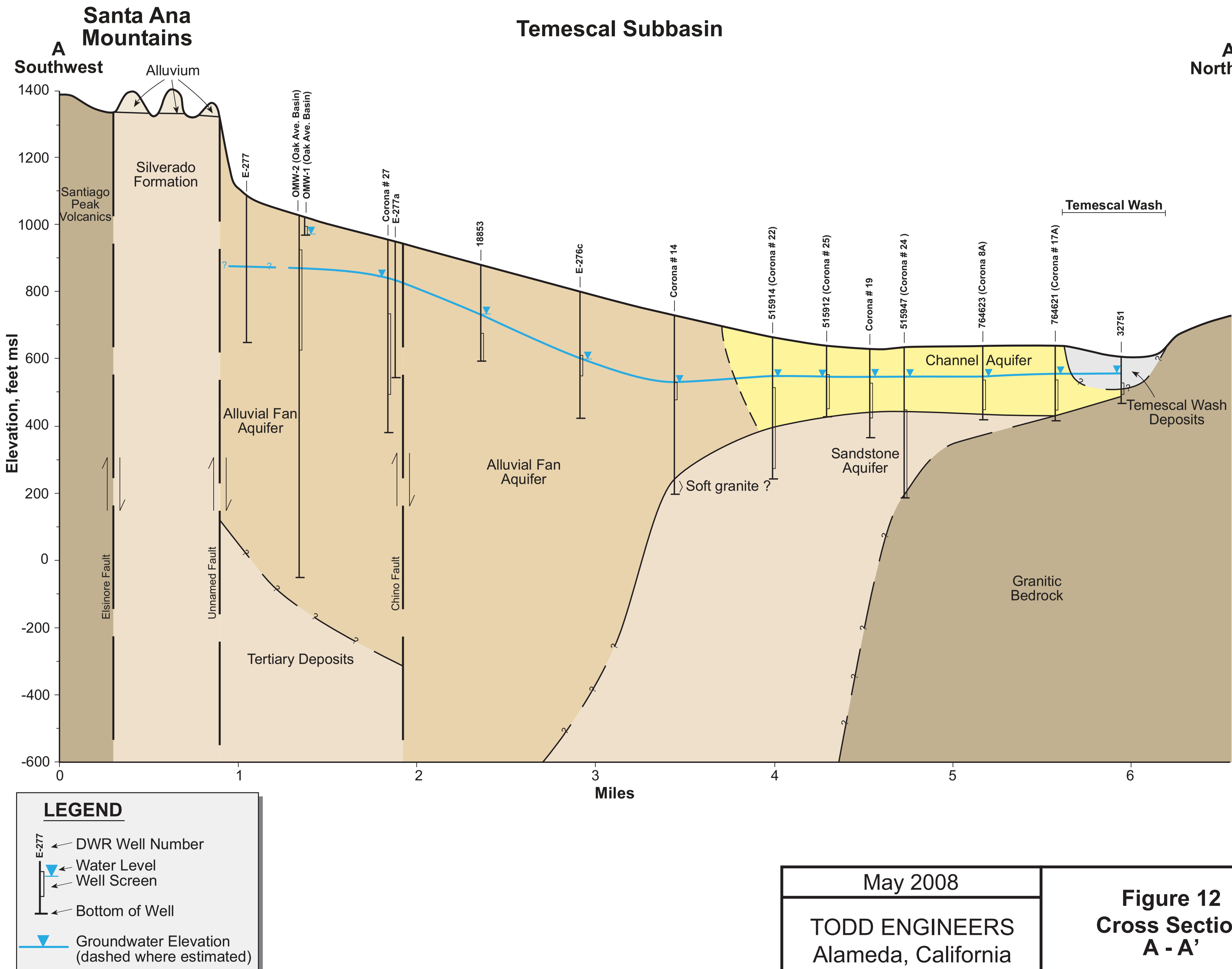

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Figure 12
Cross Section
A - A'

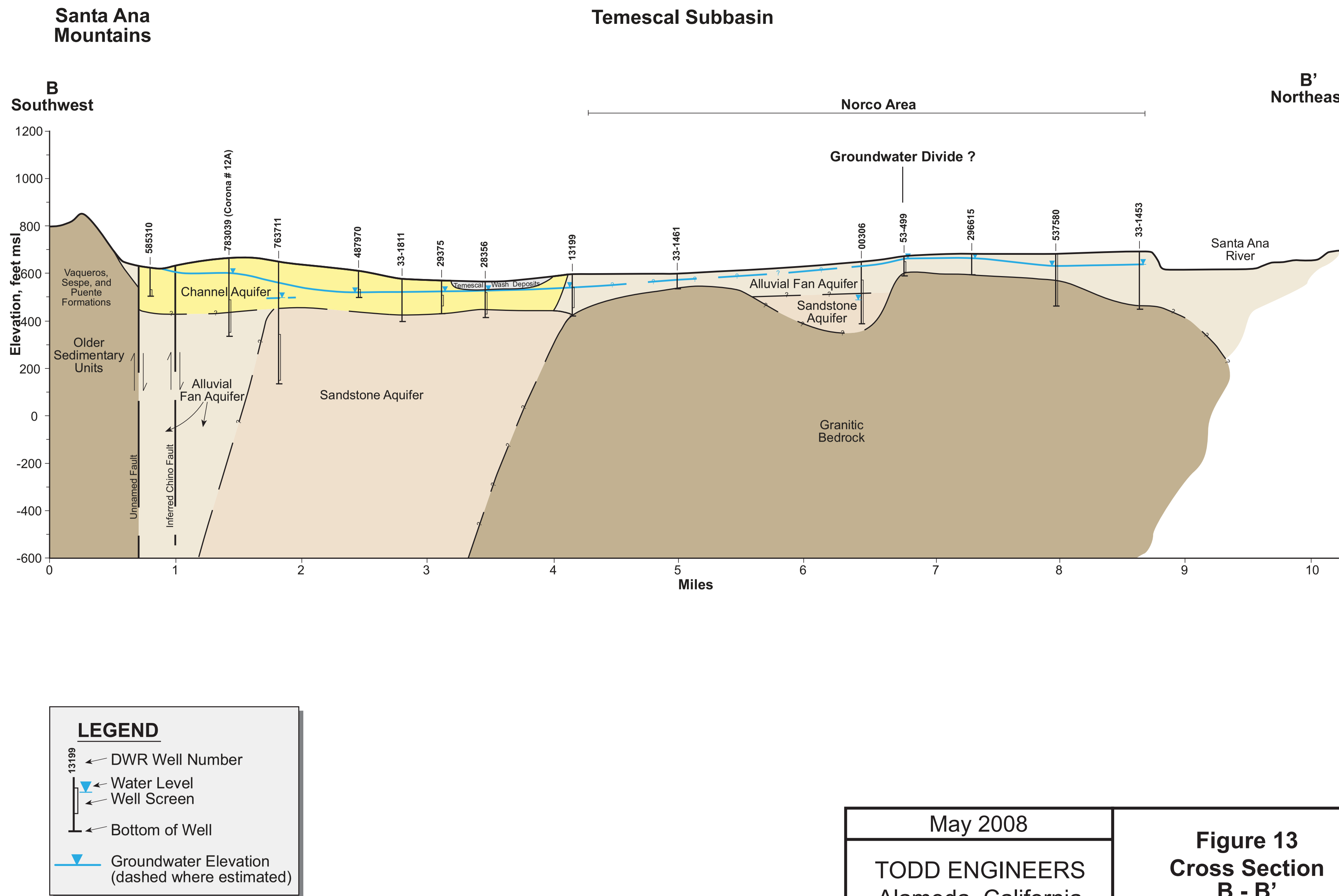

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Figure 13
Cross Section
B - B’

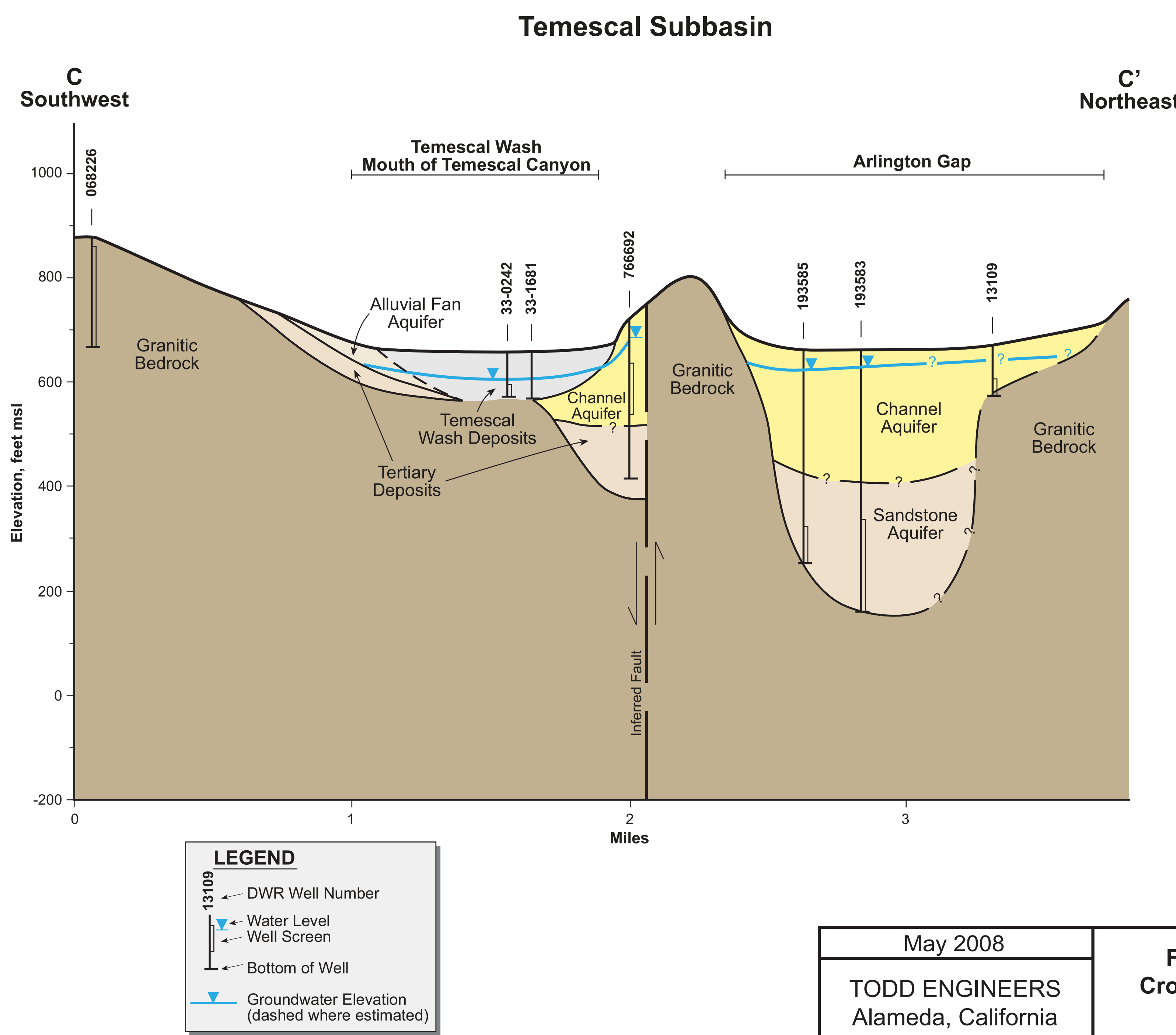

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Figure 14
Cross Section
C - C'

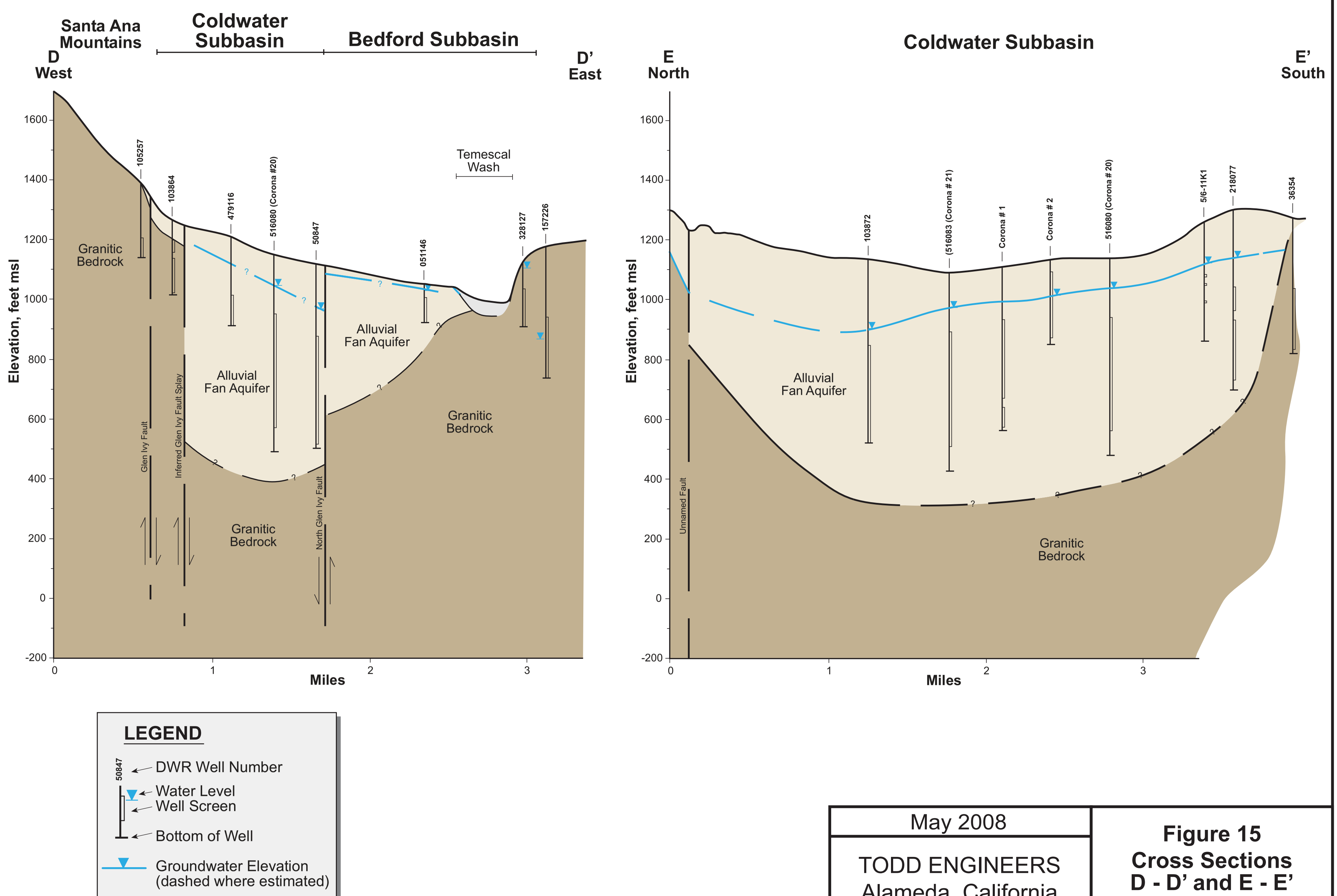

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Figure 15
Cross Sections
D - D' and E - E'

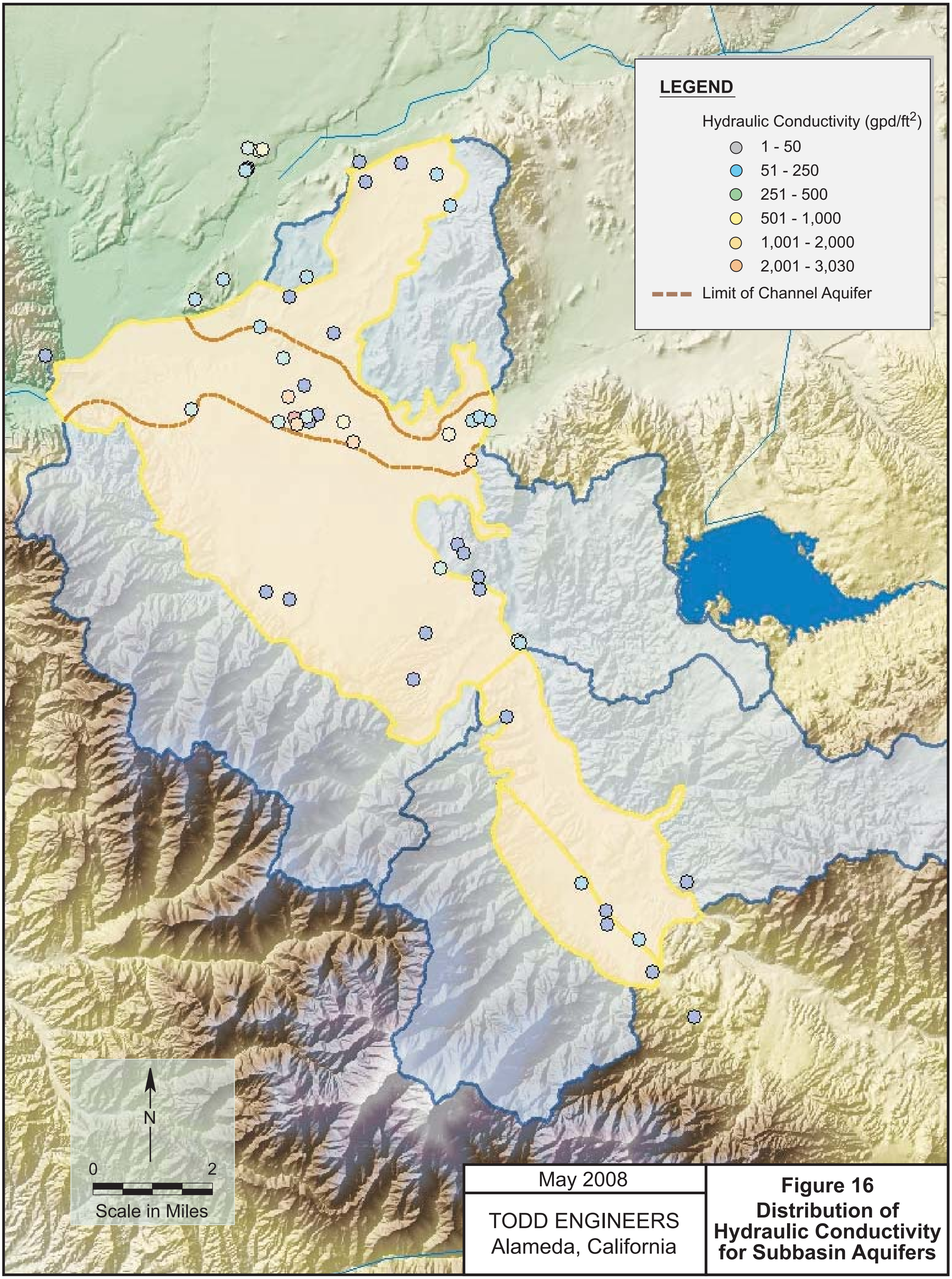

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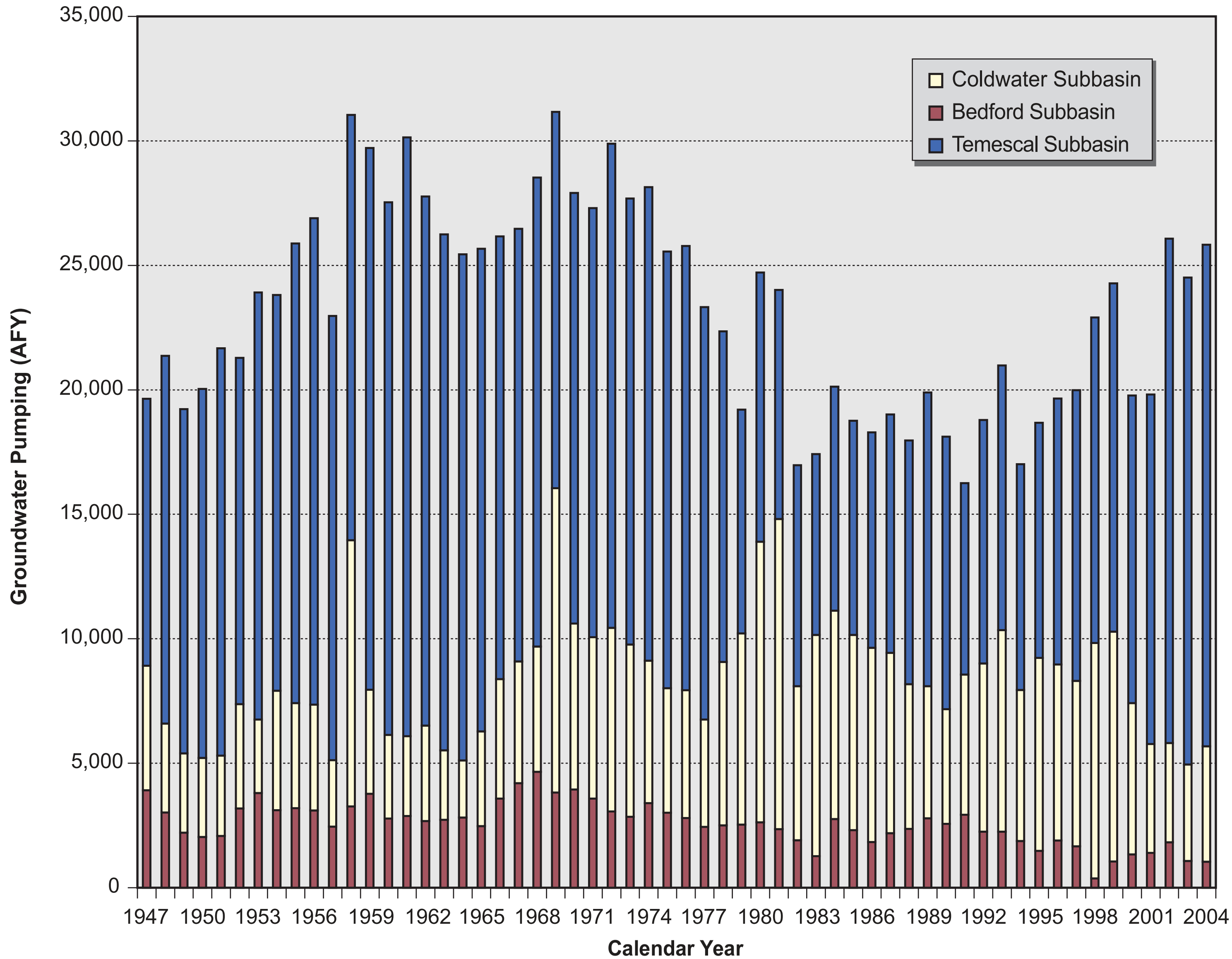
Figure 16
Distribution of Hydraulic Conductivity for Subbasin Aquifers



May 2008	**Figure 17**
TODD ENGINEERS Alameda, California	**Study Area Groundwater Pumping**

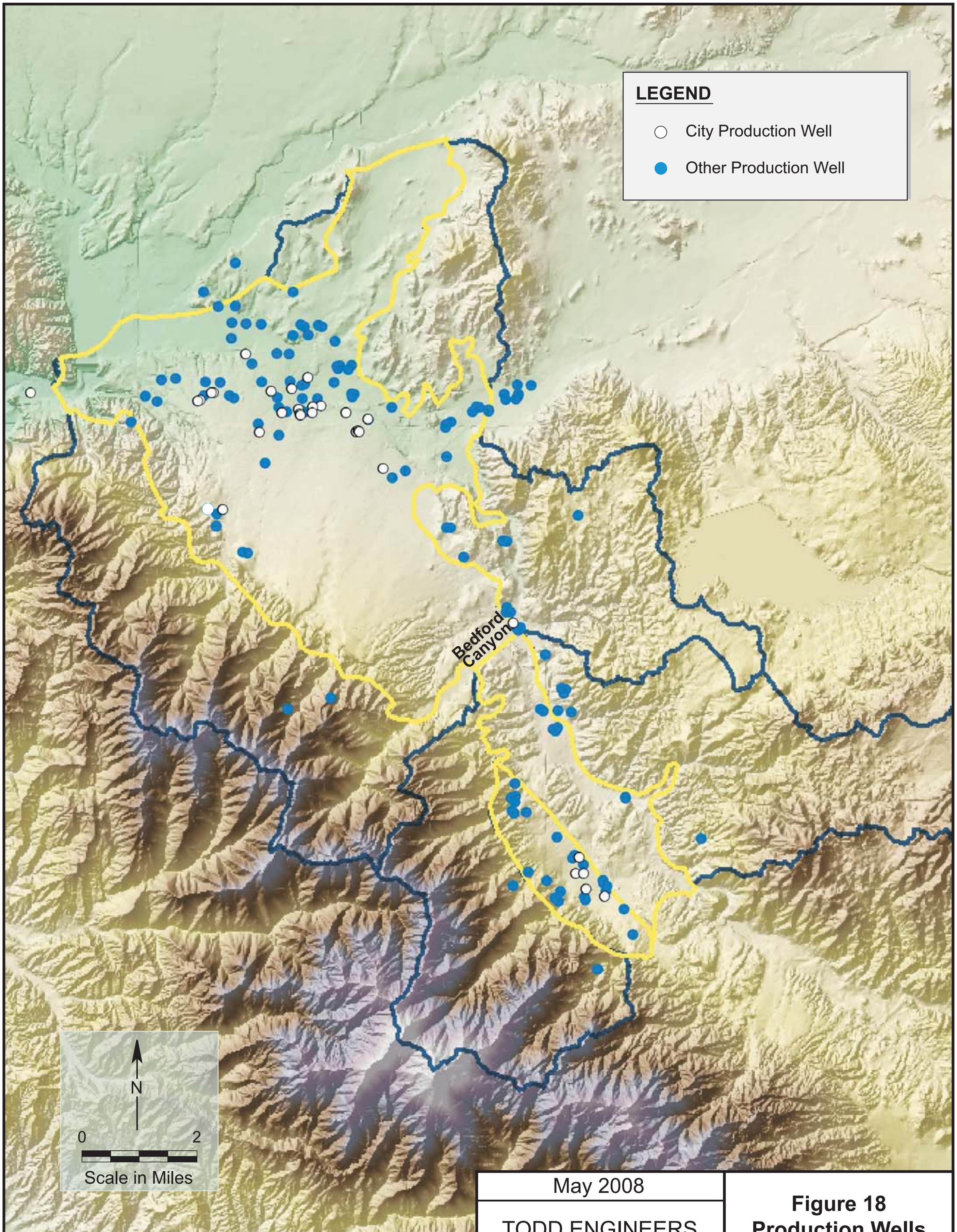


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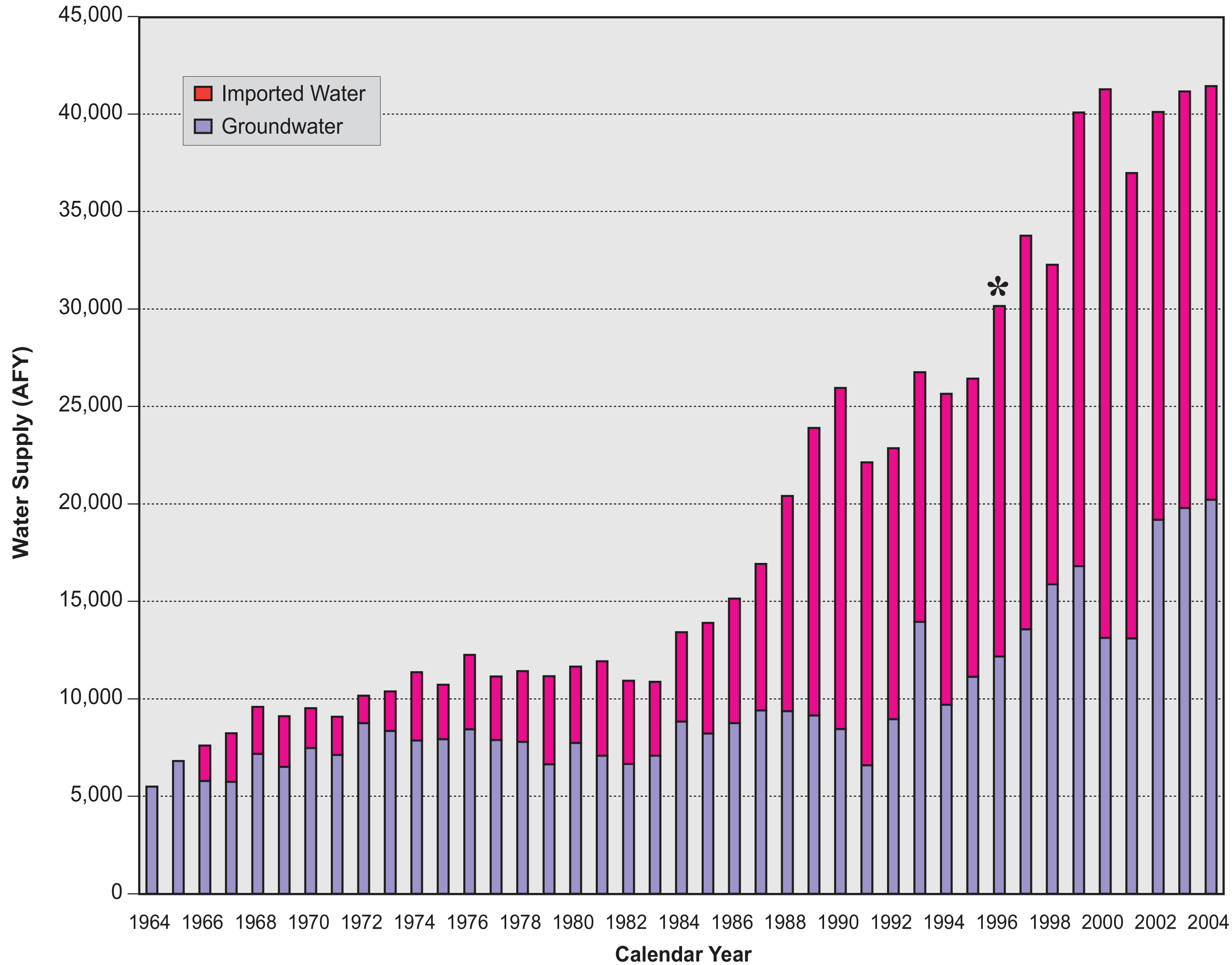
Figure 18
Production Wells
1947 - 2004



* Includes estimates for missing data between July 1996 and December 1996.

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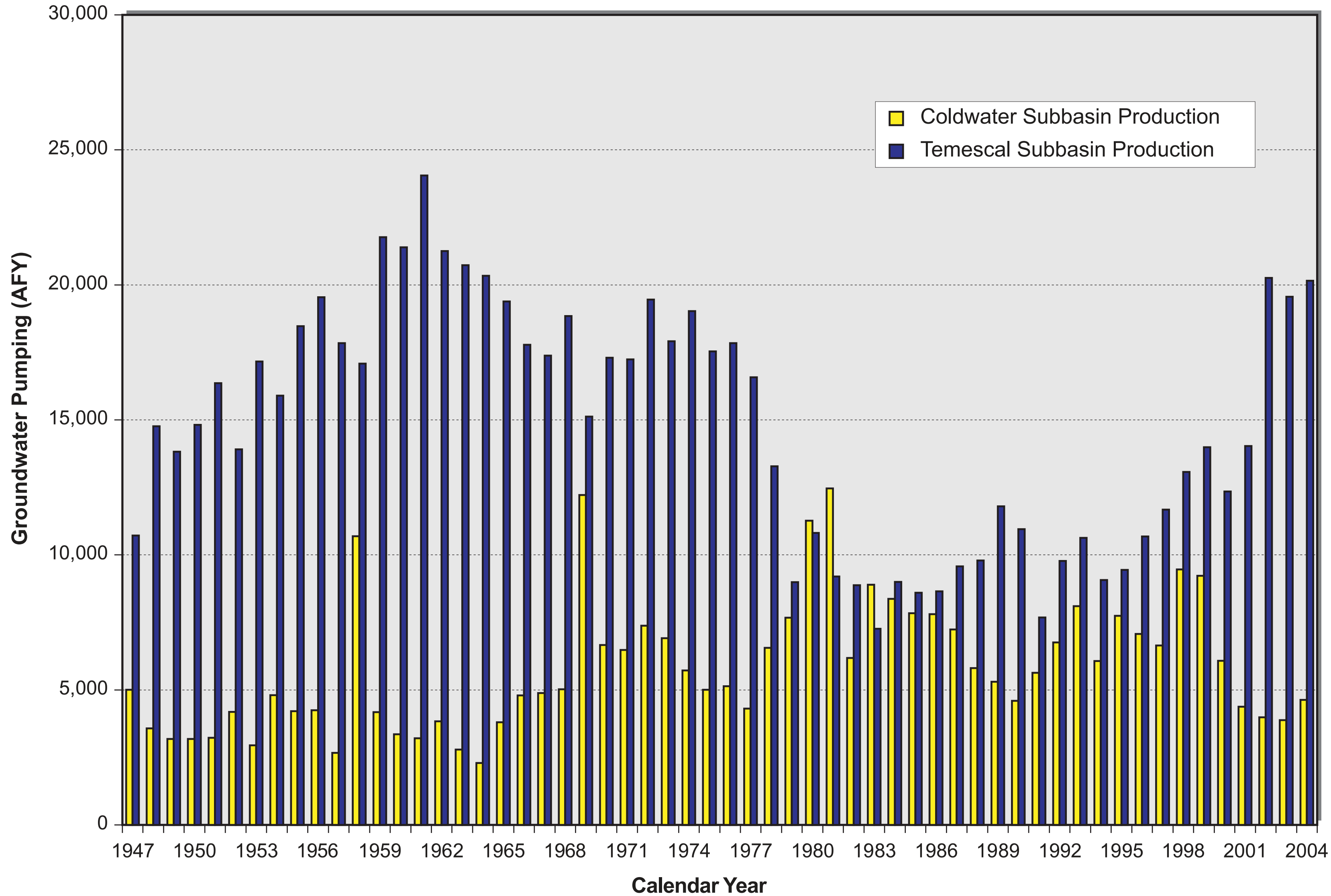
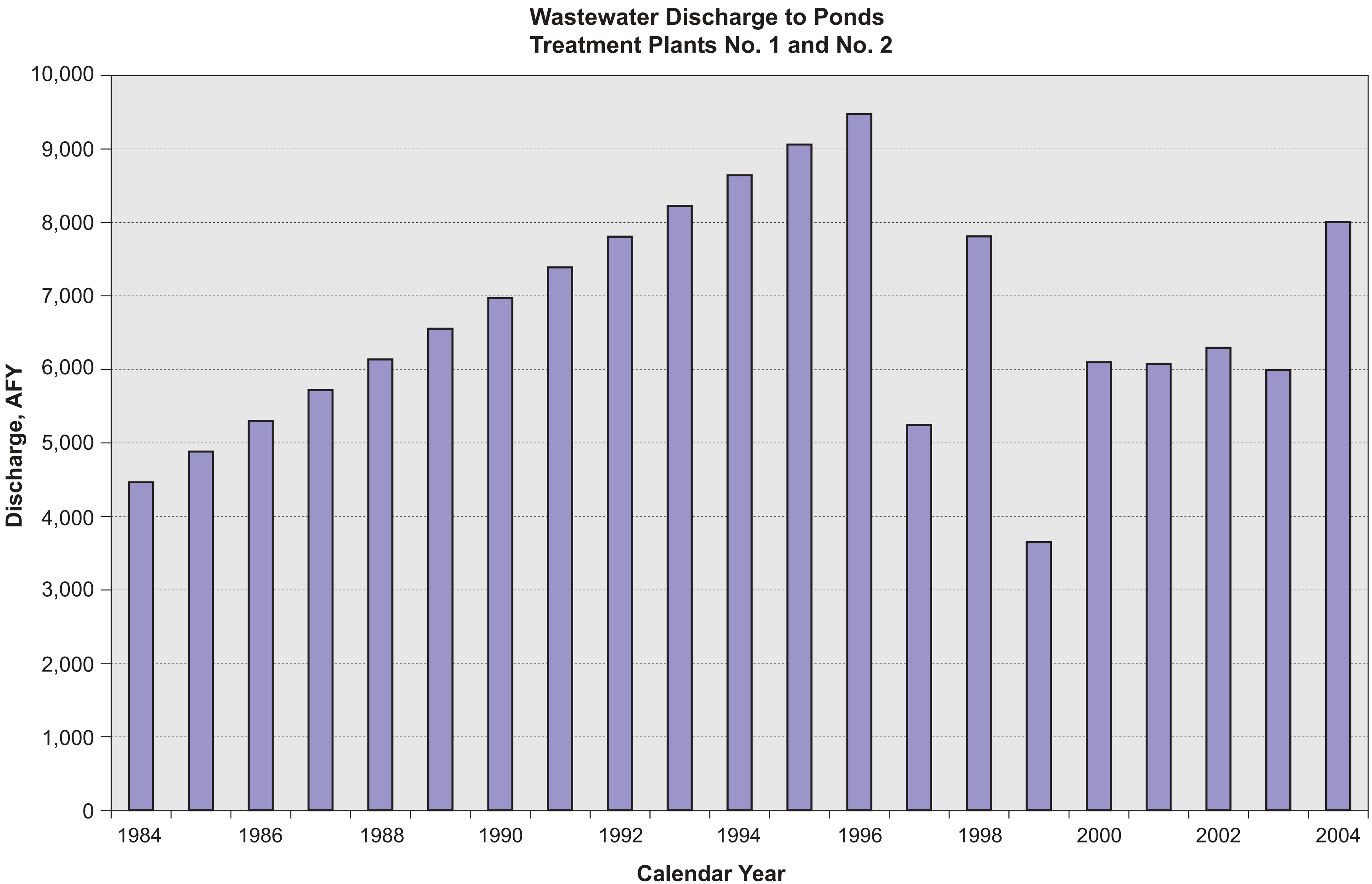
Figure 19
City of Corona Water Supply



May 2008	**Figure 20**
TODD ENGINEERS Alameda, California	**Pumping in Temescal and Coldwater Subbasins**



Note: Prior to 1997, all effluent was discharged to percolation ponds.
After 1997, effluent was discharged to ponds and Temescal Wash.
Effluent discharge 1984 - 1996 estimated based on population.

May 2008	**Figure 21**
TODD ENGINEERS Alameda, California	**Wastewater Discharge to Ponds**

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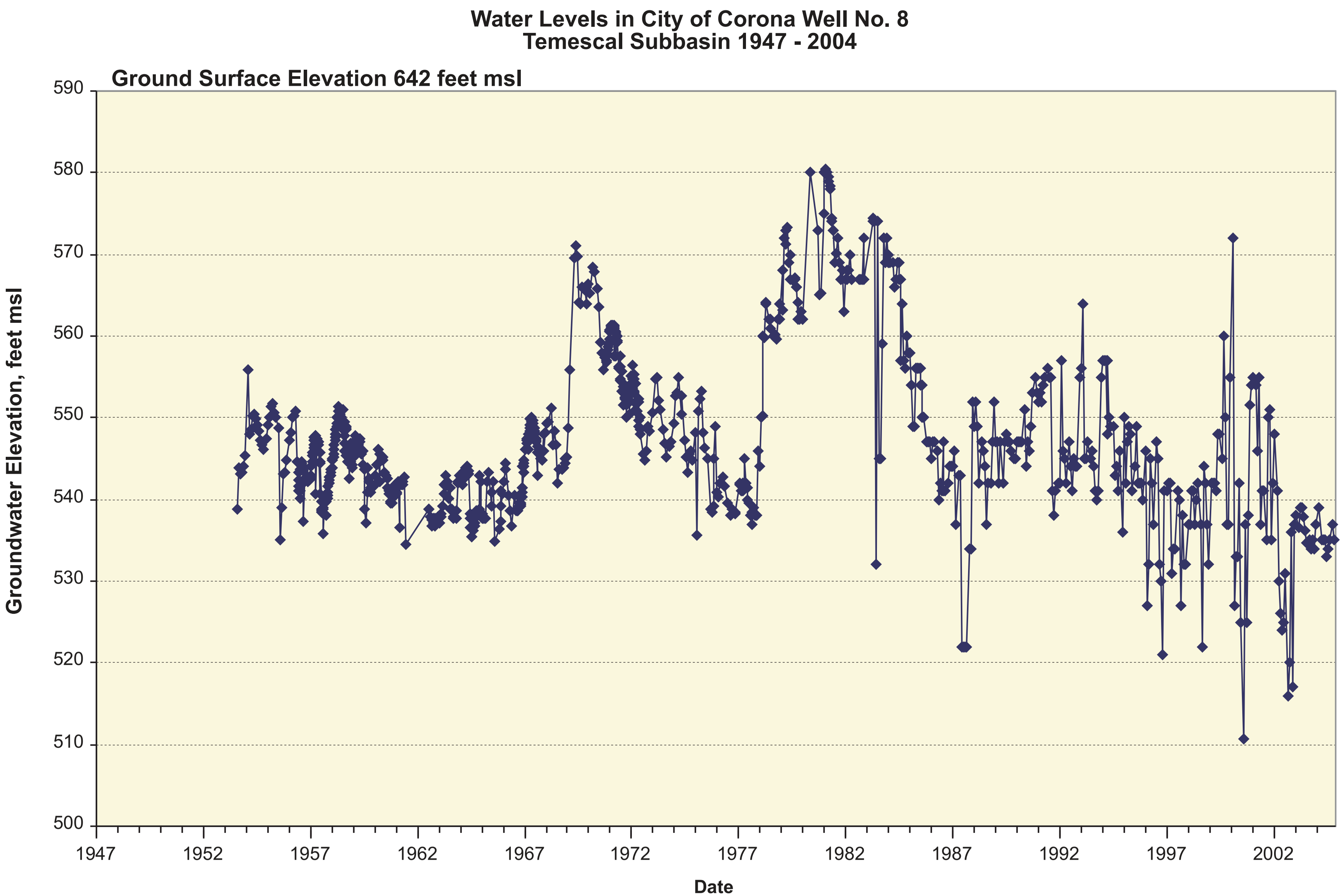
Figure 22
Location of Key Hydrographs



May 2008 TODD ENGINEERS Alameda, California	**Figure 23** **Temescal Subbasin** **Hydrograph**

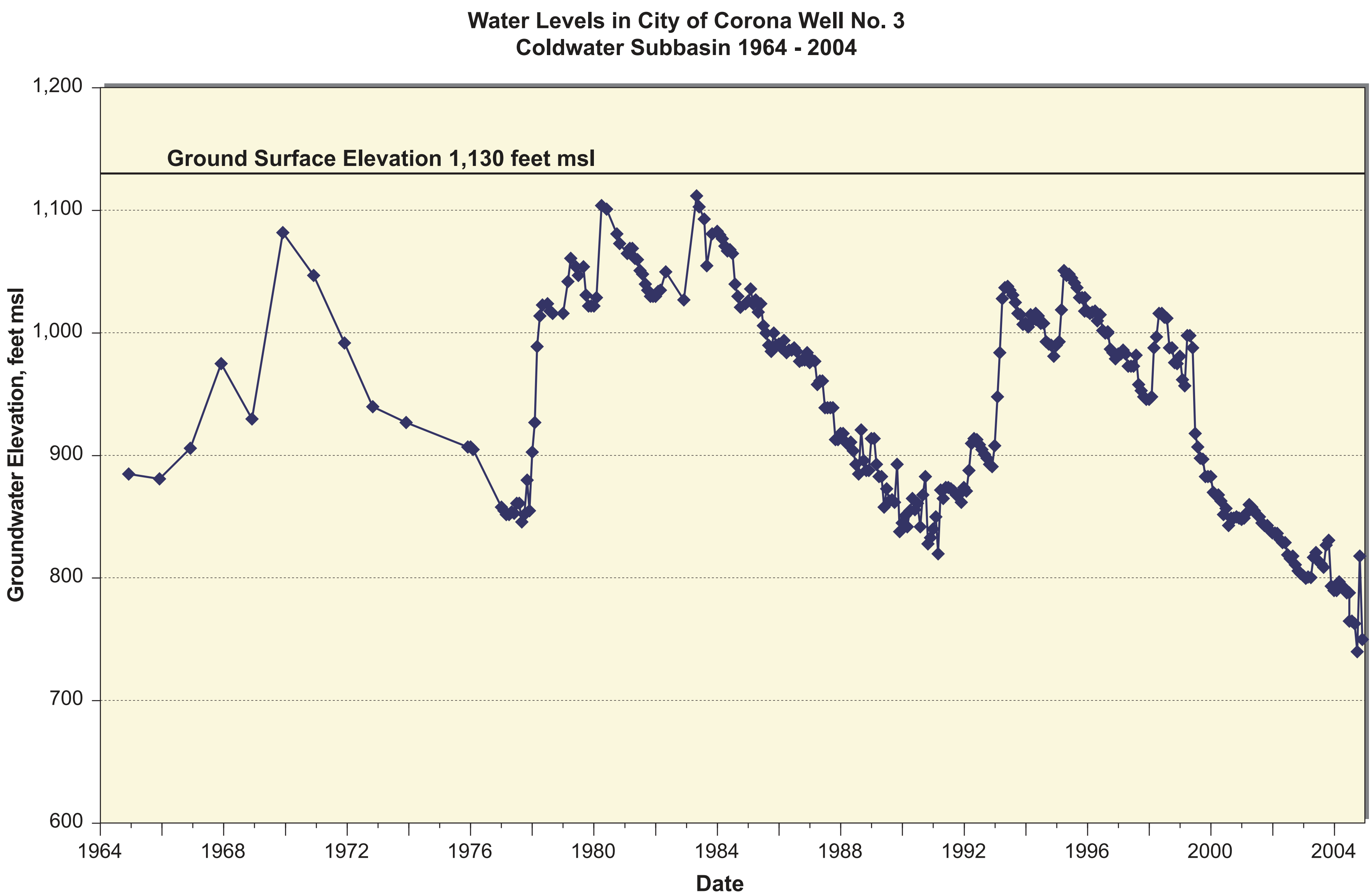


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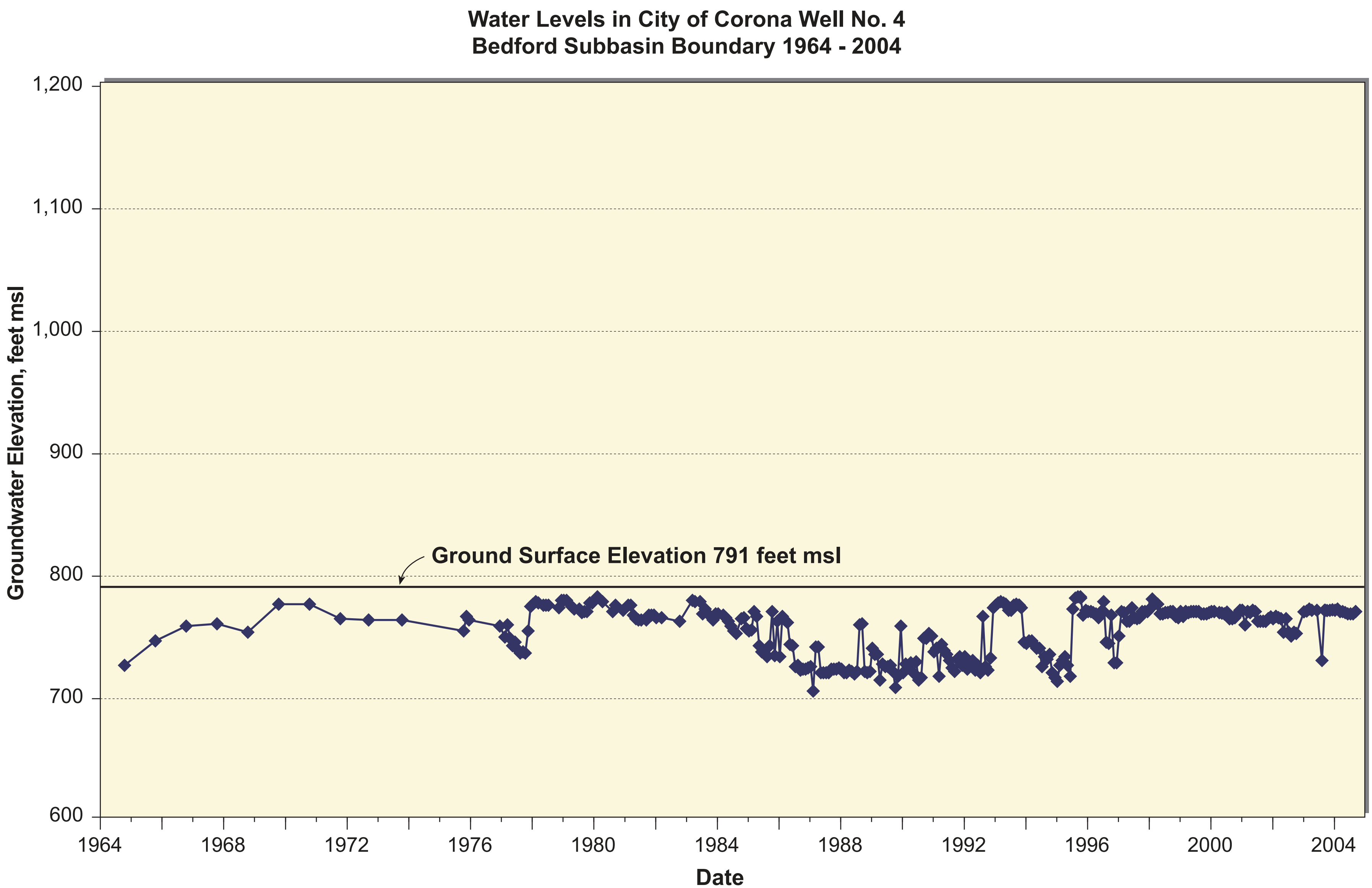
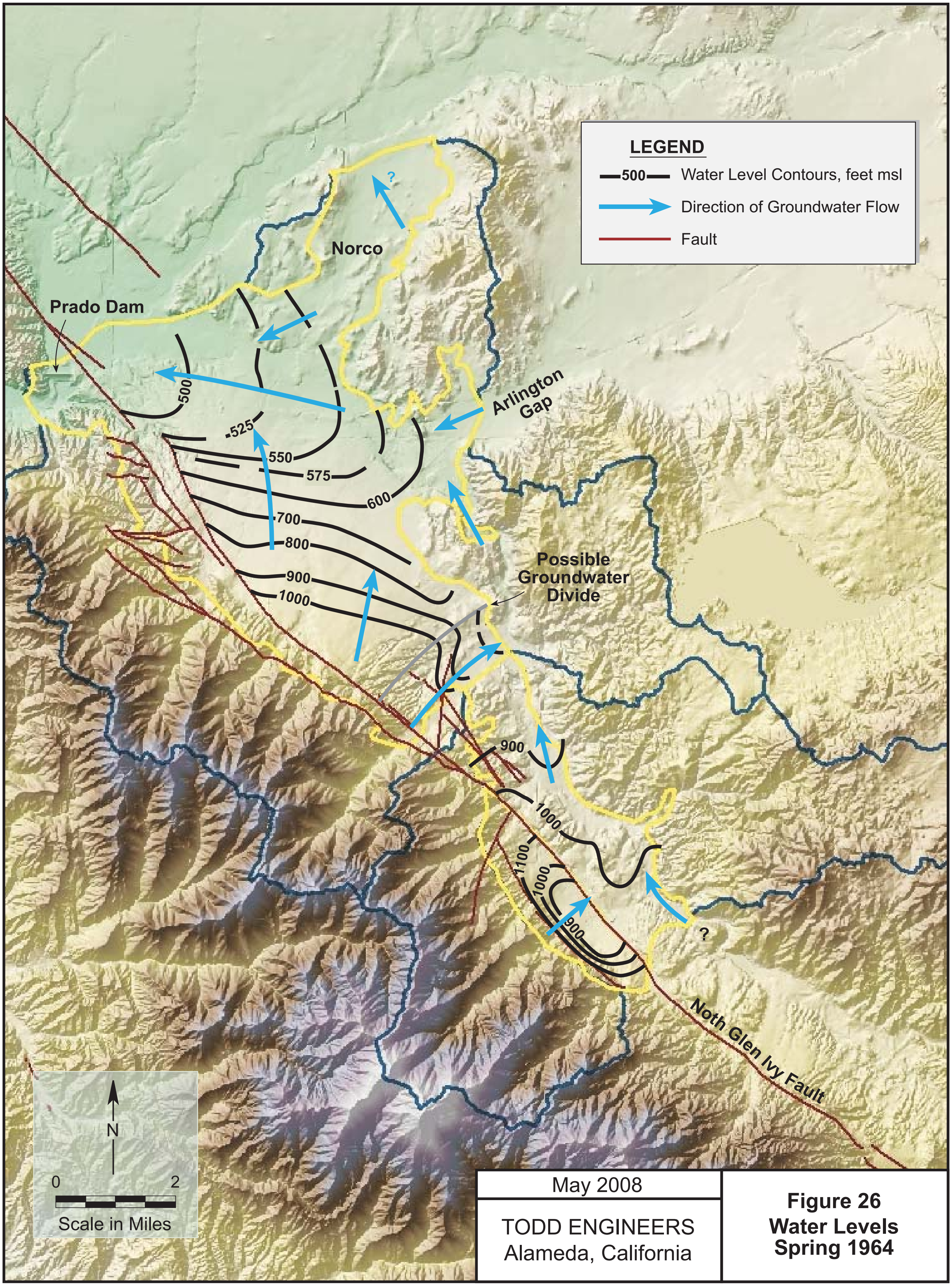
Figure 24
Coldwater Subbasin
Hydrograph



May 2008 TODD ENGINEERS Alameda, California	**Figure 25** **Bedford Canyon Hydrograph**



May 2008

TODD ENGINEERS
Alameda, California

Figure 26
Water Levels
Spring 1964

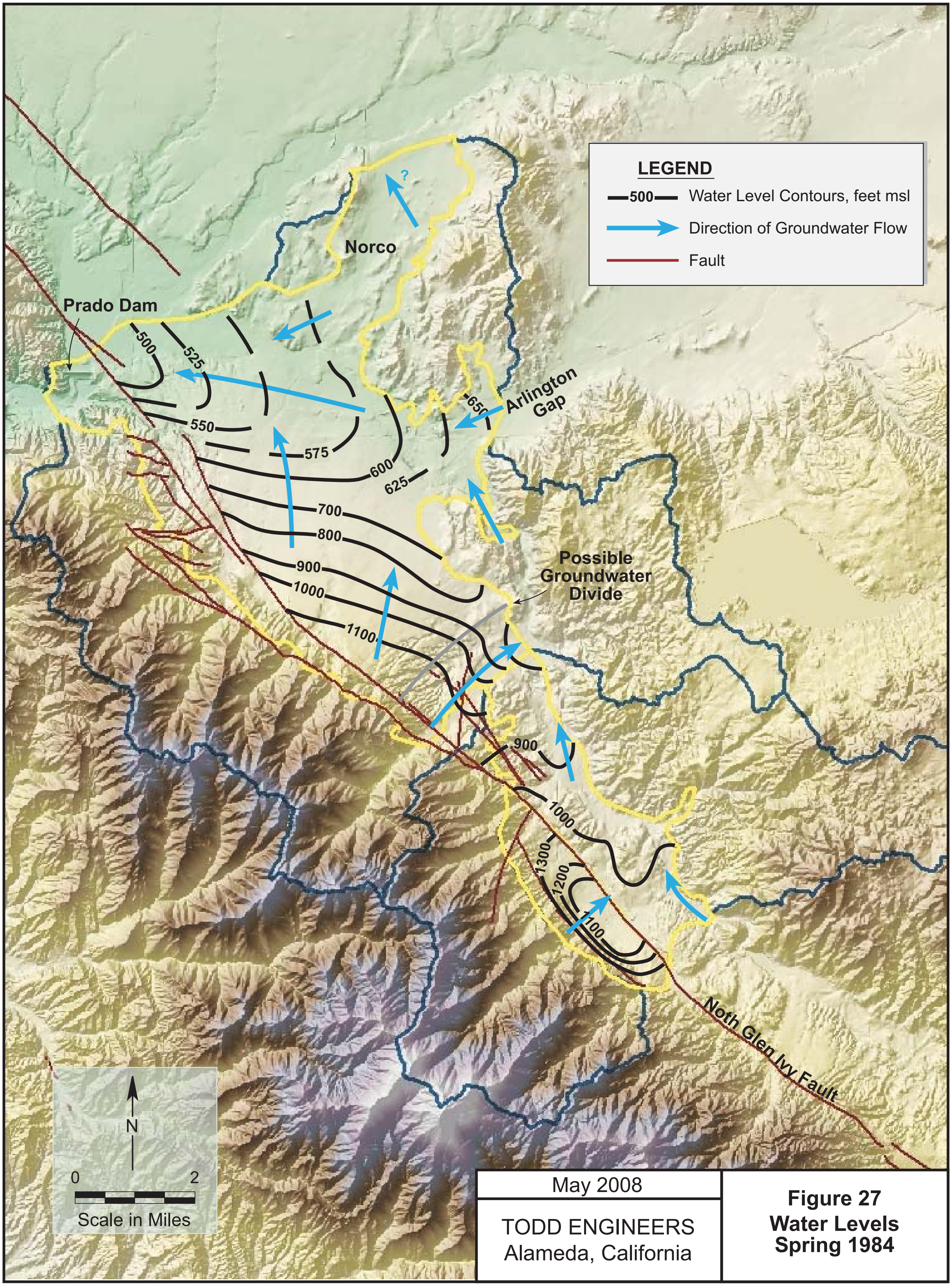
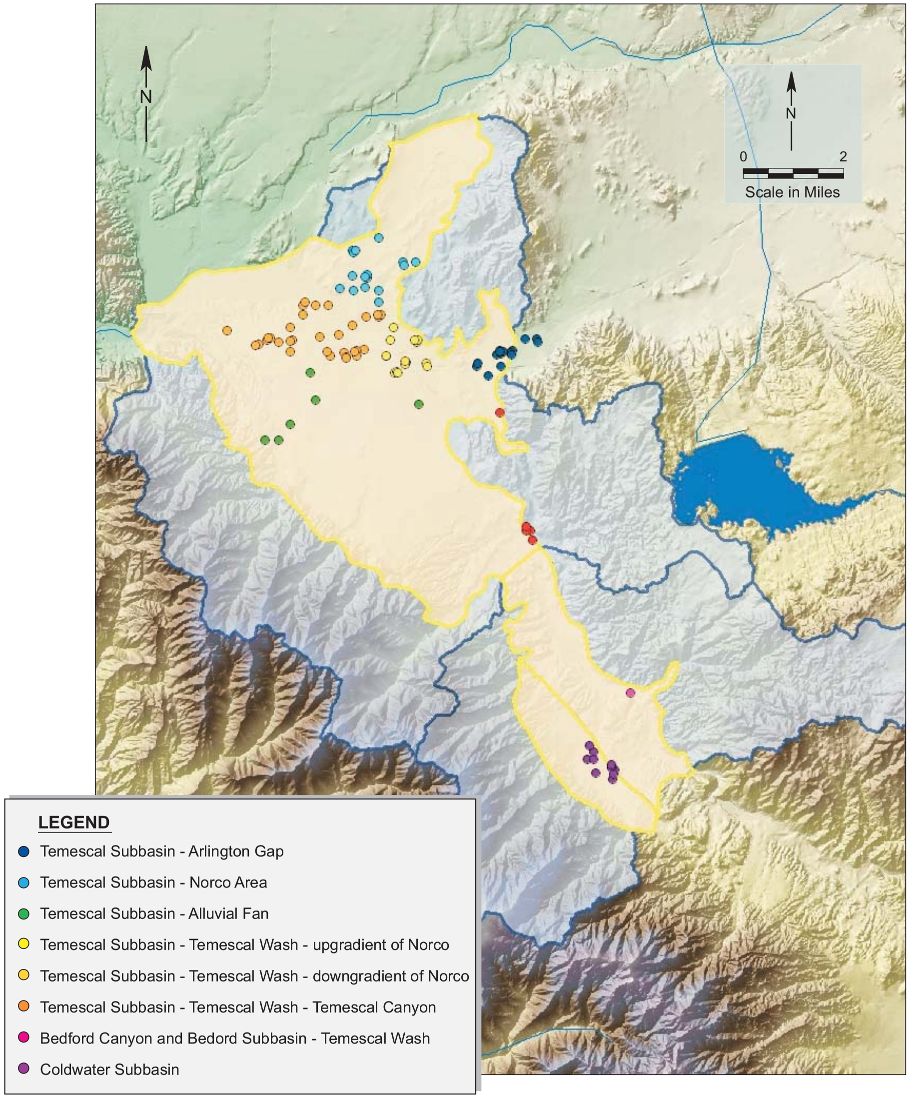
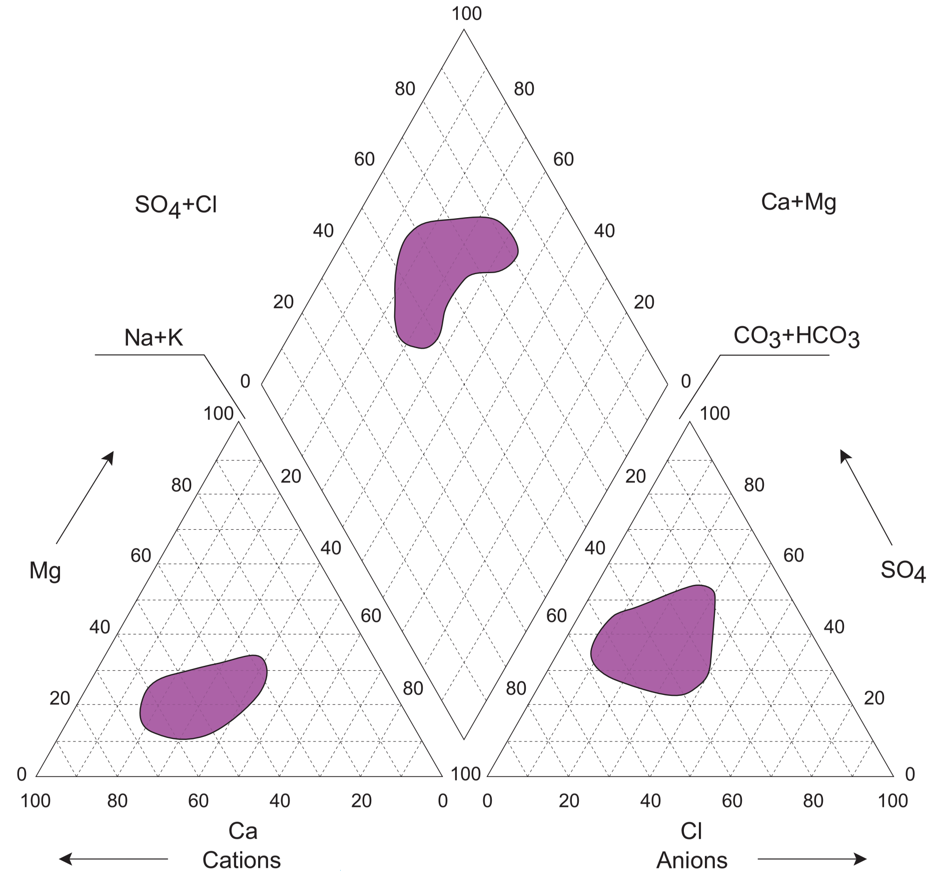


Figure 27
Water Levels
Spring 1984

Water Quality Data Sets by Area



Coldwater Subbasin

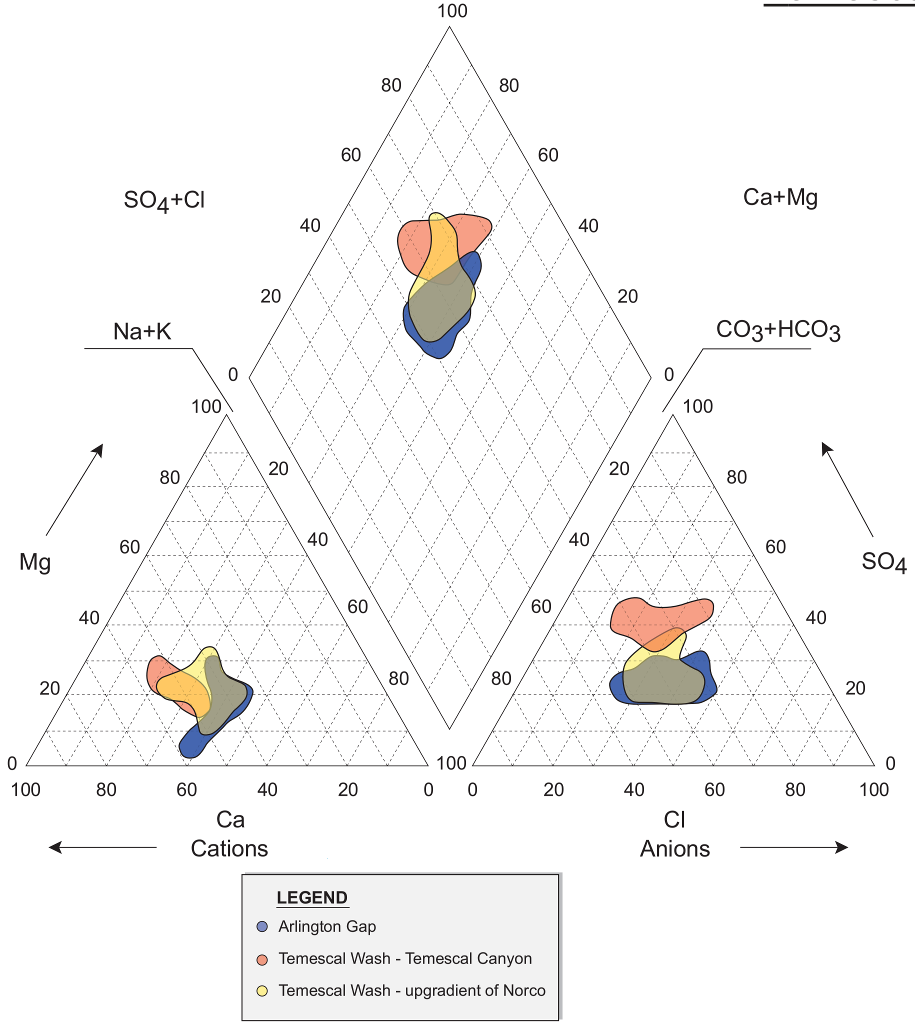


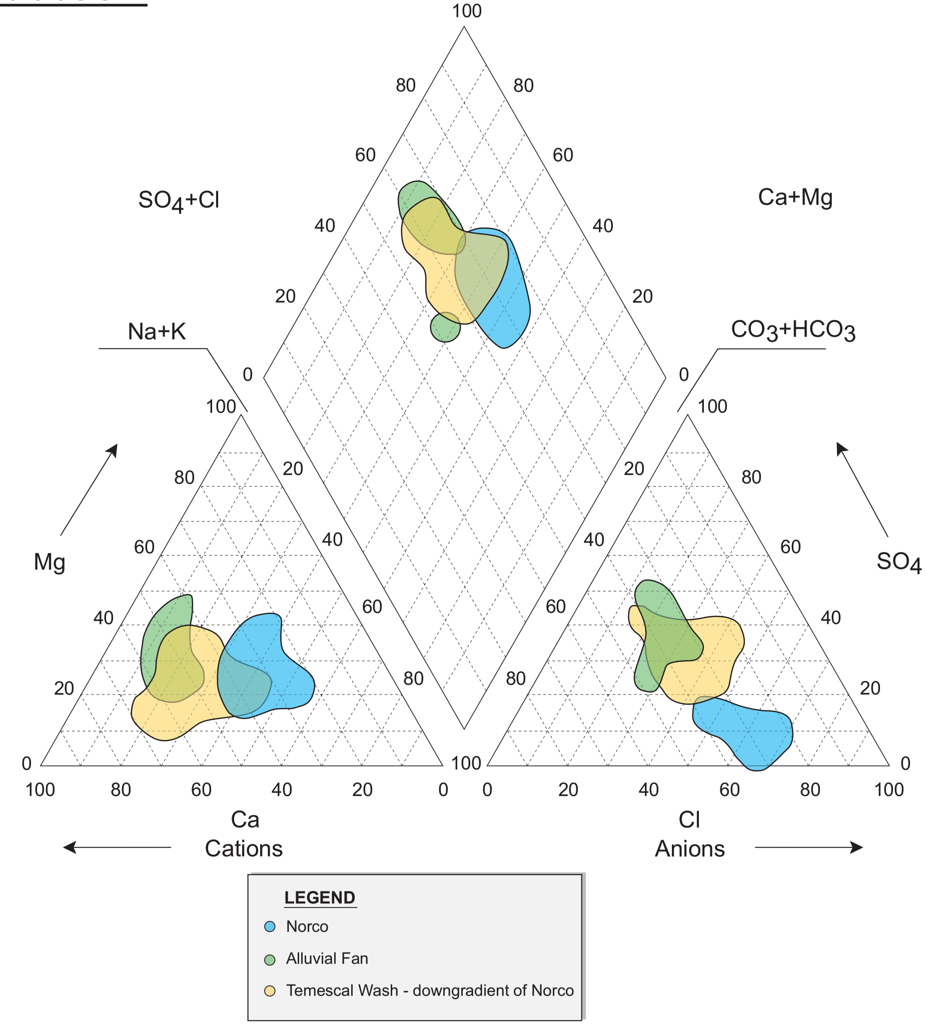
May 2008

TODD ENGINEERS
Alameda, California

Figure 28
Water Quality Analysis and Coldwater Subbasin Water Chemistry

Temescal Subbasin





Colors correspond to map locations on Figure 28.

May 2008	**Figure 29 Variability of Water Chemistry Among Aquifers - Temescal Subbasin**
TODD ENGINEERS Alameda, California	

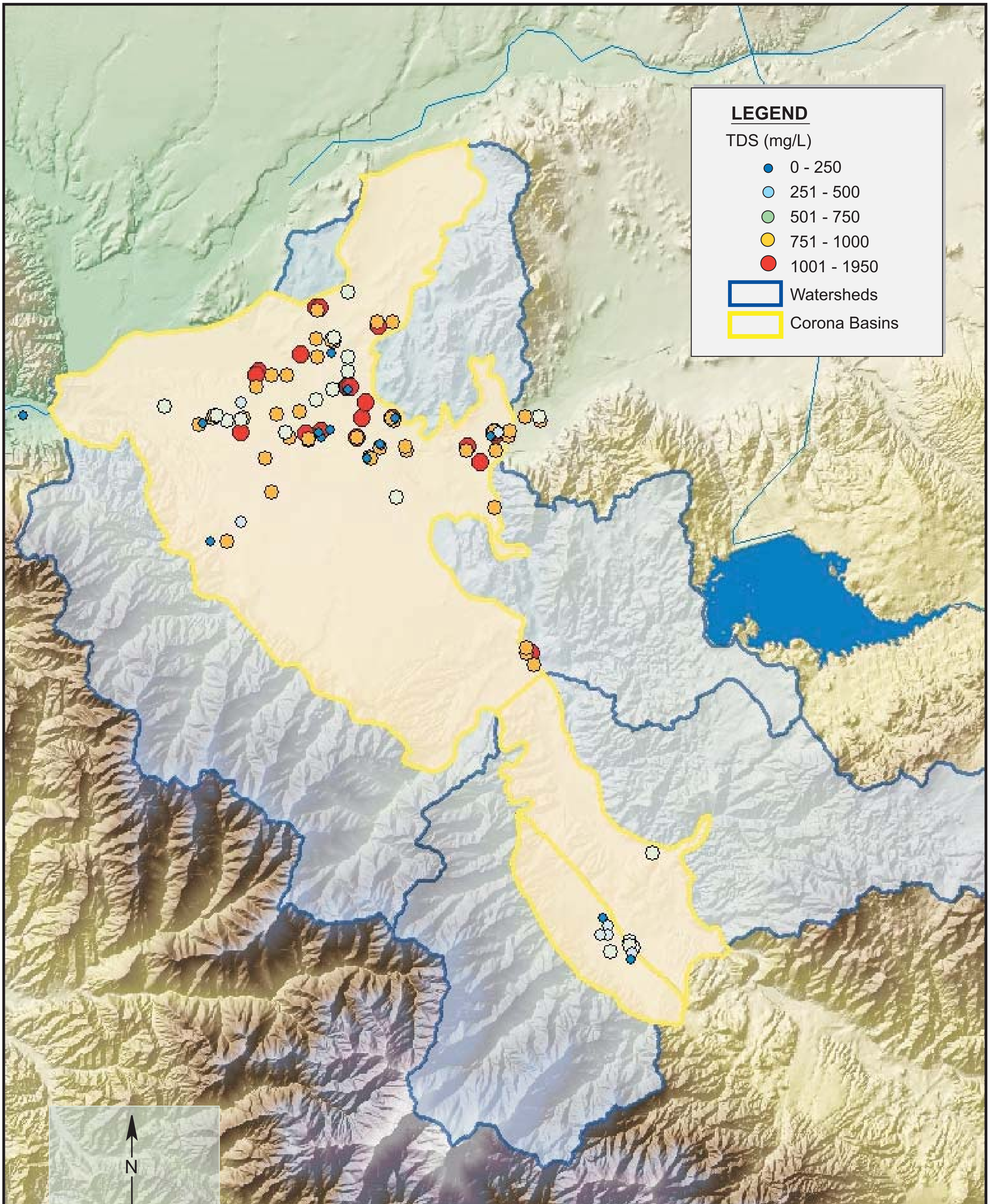
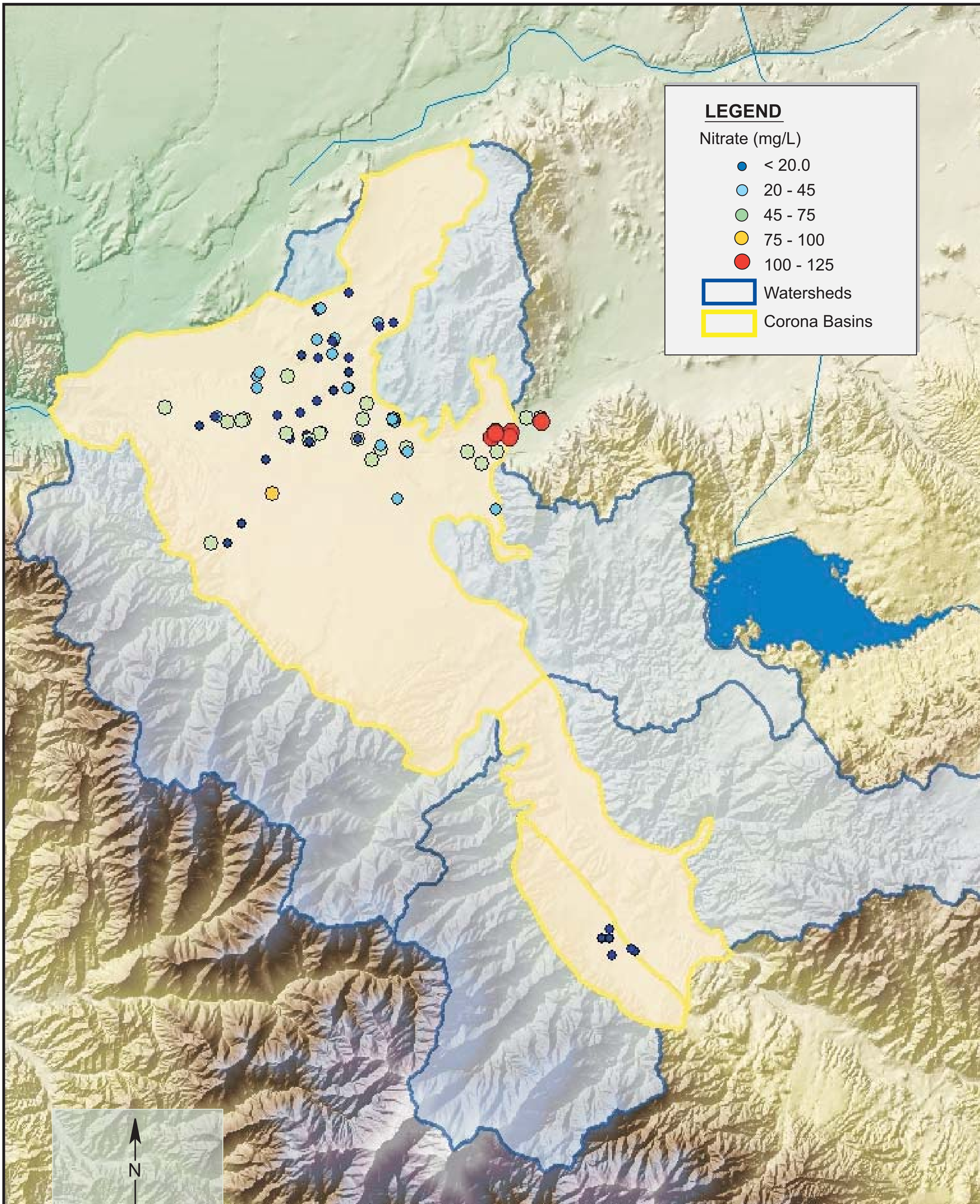


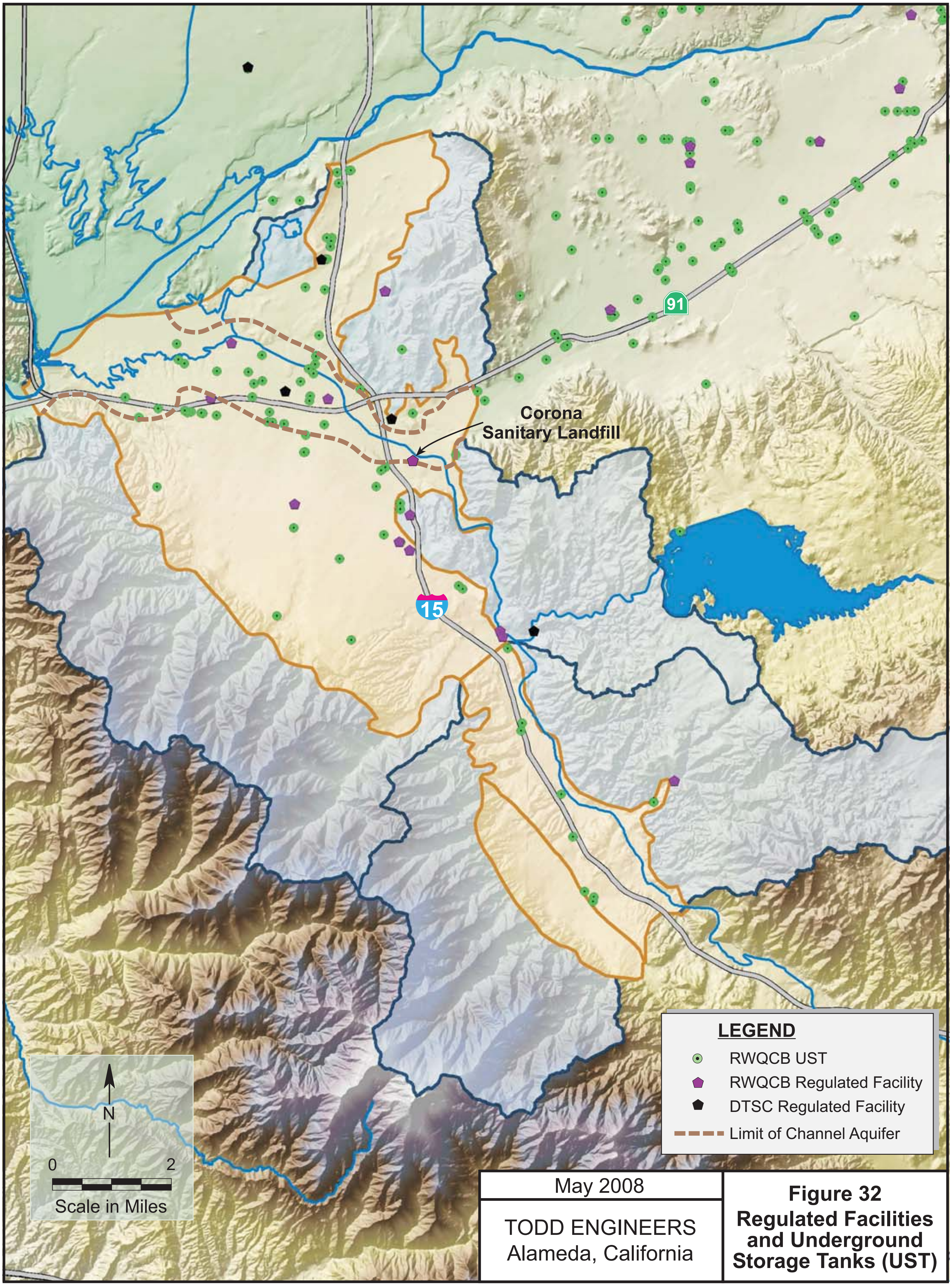
Figure 30
Distribution of Total Dissolved Solids Concentrations in Groundwater



May 2008

TODD ENGINEERS
Alameda, California

Figure 31
Distribution of Nitrate Concentrations in Groundwater



May 2008

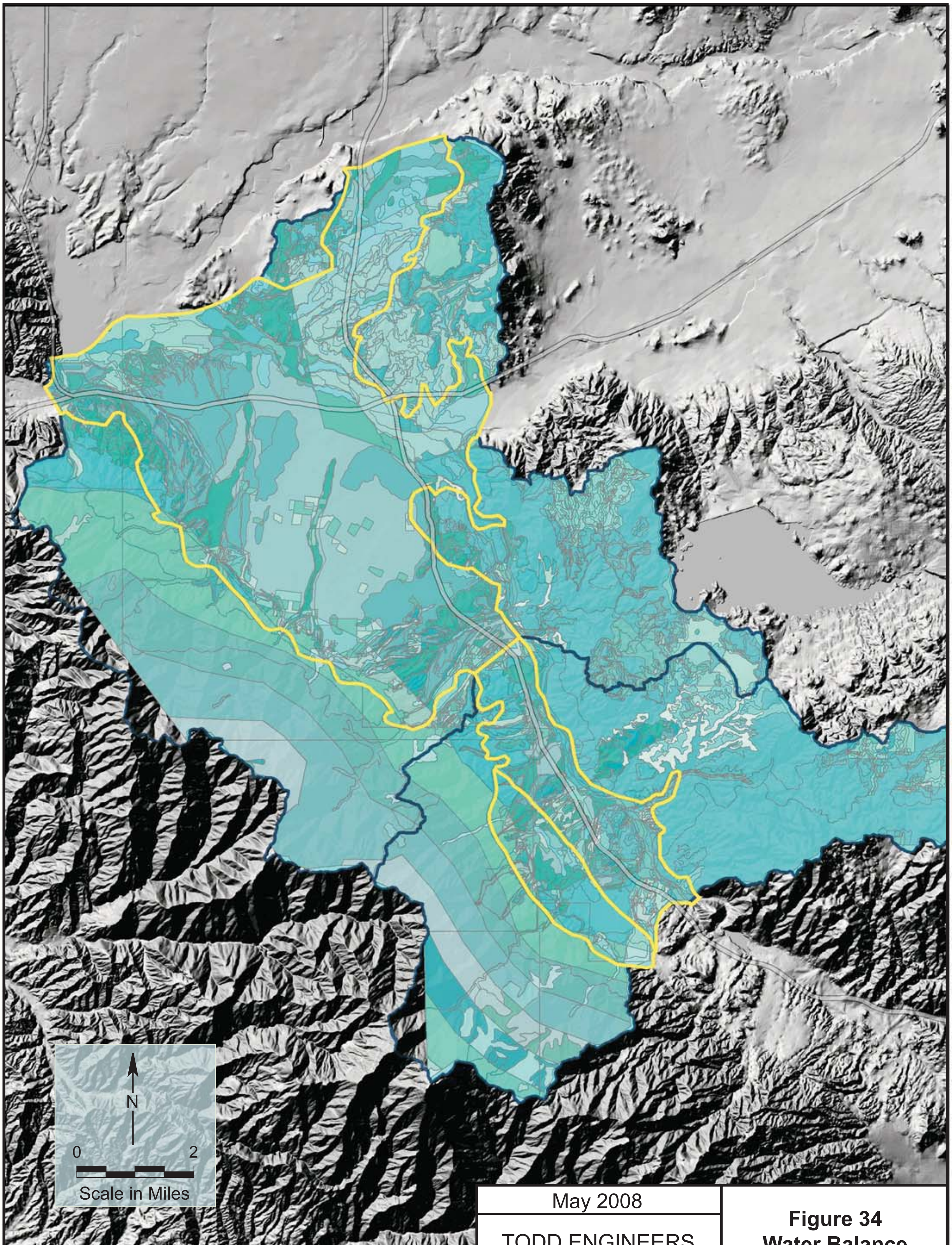
TODD ENGINEERS
Alameda, California

Figure 32
Regulated Facilities and Underground Storage Tanks (UST)

May 2008

TODD ENGINEERS
Alameda, California

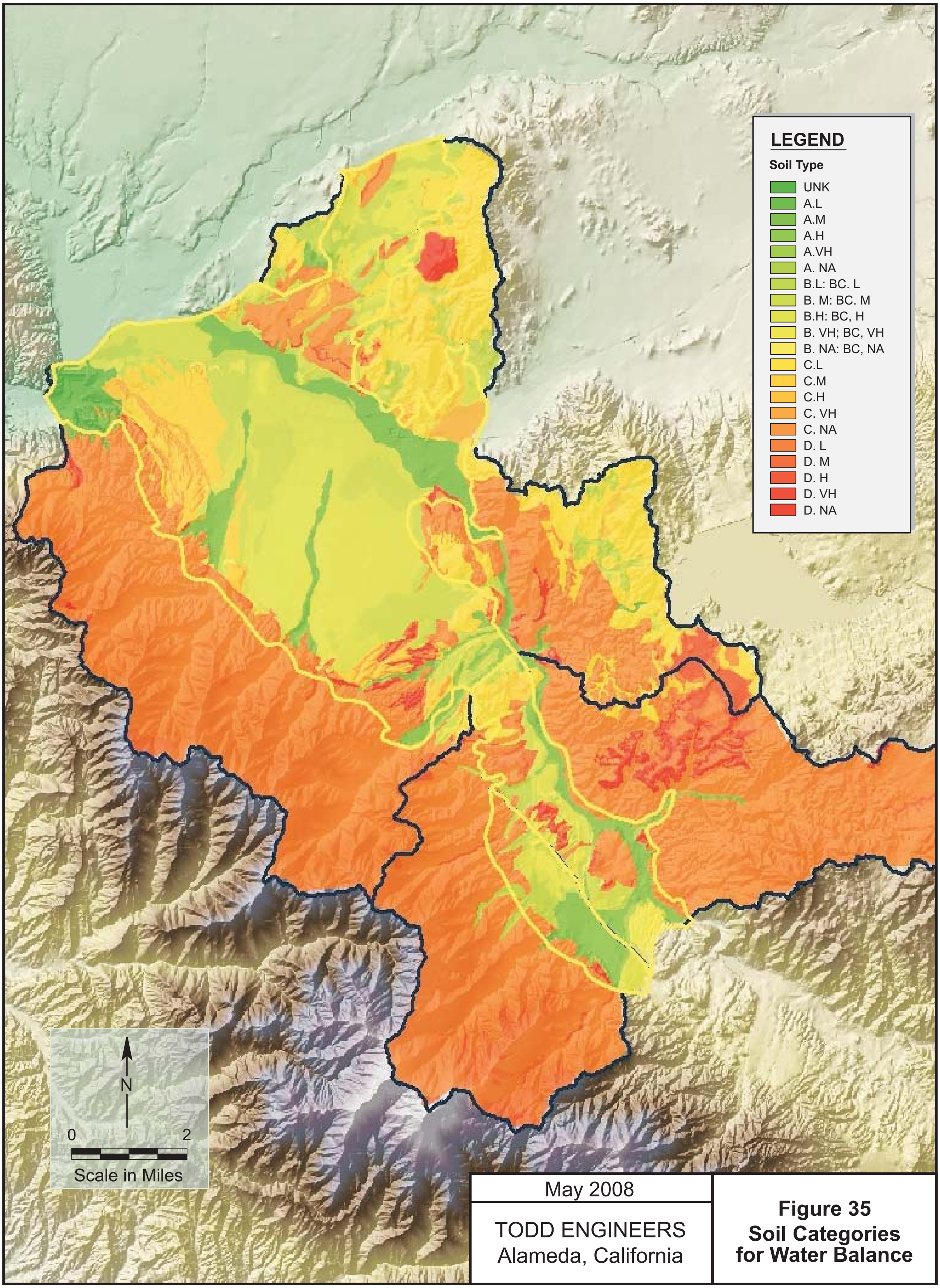
Figure 33
Water Balance Units



May 2008

TODD ENGINEERS
Alameda, California

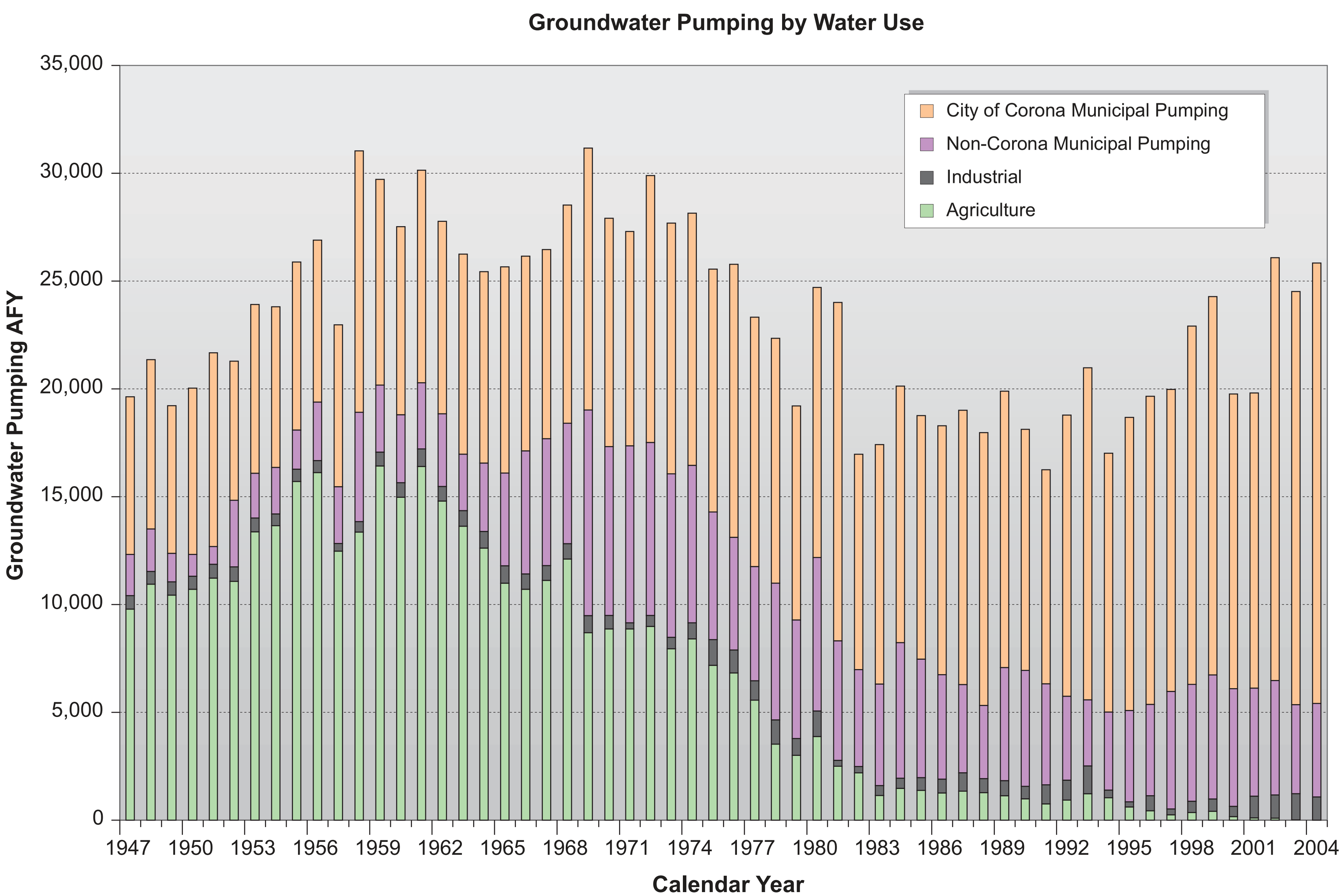
Figure 34
Water Balance Elements



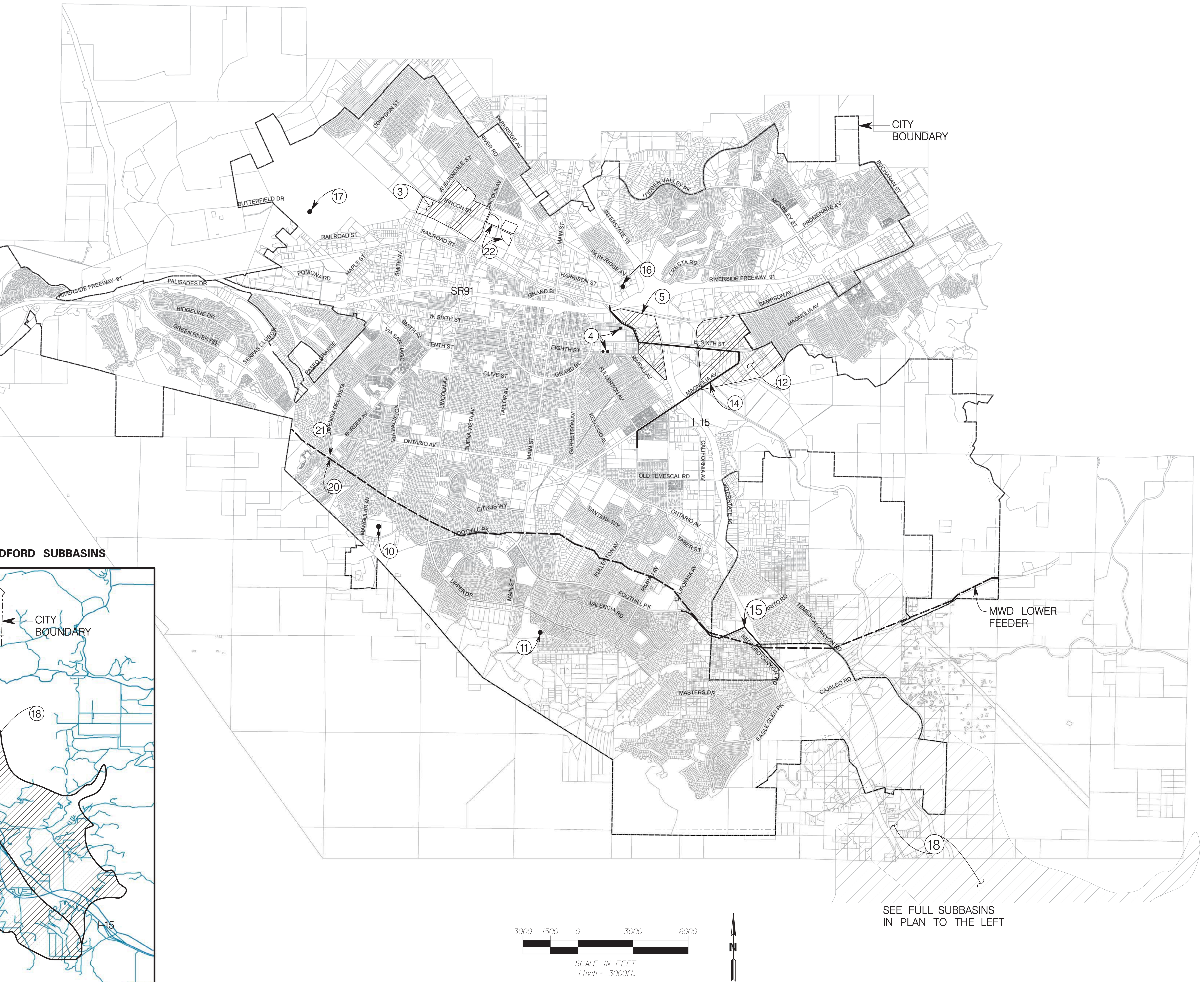
May 2008

TODD ENGINEERS
Alameda, California

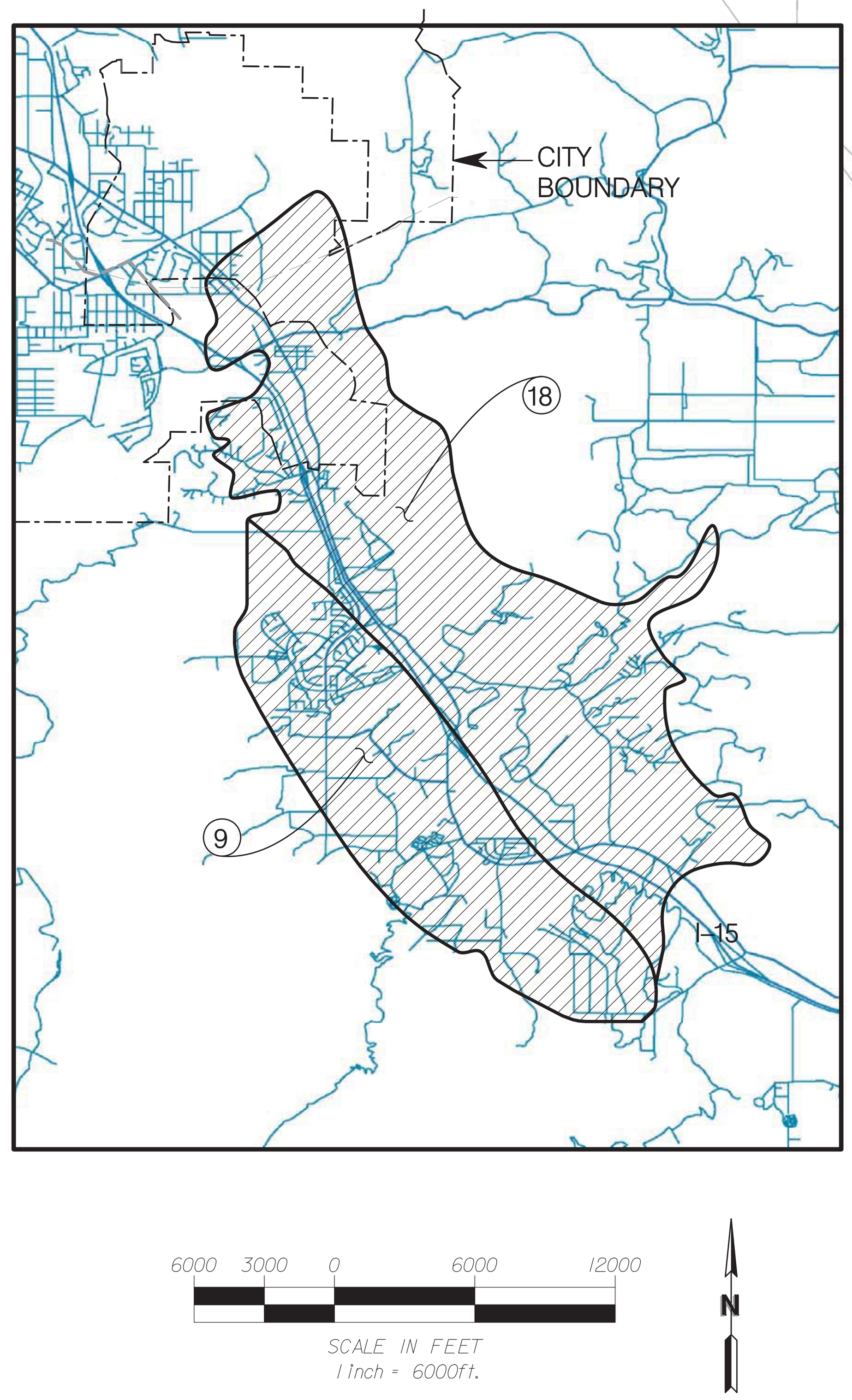
Figure 35
Soil Categories for Water Balance



May 2008 TODD ENGINEERS Alameda, California	**Figure 36** **Groundwater Pumping by Water Use**



COLDWATER AND BEDFORD SUBBASINS



PROJECT LOCATIONS	
ITEM	DESCRIPTION
1	NEW WATER WELLS (CITY WIDE)
2	REPLACEMENT WATER WELLS (CITY WIDE)
3	RINCON GROUNDWATER TREATMENT PROJECT
4	WELLHEAD TREATMENT FOR WELLS 6, 7, AND 17
5	EL SOBRANTE GROUNDWATER TREATMENT PROJECT
6	GROUNDWATER TREATMENT PROGRAM (CITY WIDE)
7	GROUNDWATER BLENDING PROGRAM (CITY WIDE)
8	IMPROVEMENT OF GROUNDWATER QUANTITY/QUALITY MONITORING PROGRAM (CITY WIDE)
9	COLDWATER SUBBASIN ENHANCED RECHARGE PROGRAM
10	RECHARGE BASINS WITHIN OAK AVENUE DETENTION BASIN
11	RECHARGE BASINS WITHIN MAIN STREET DETENTION BASIN
12	UPGRADIENT INJECTION WELLS
13	RECYCLED WATER INJECTION WELLS (LOCATION TO BE DETERMINED)
14	RECYCLED WATER ZONE 3 TO ZONE 2 INTERCONNECT
15	RECYCLED WATER ZONE 4 TO ZONE 3 INTERCONNECT
16	WWTP2 UPGRADE TO TERTIARY
17	WWTP1A UPGRADE TO TERTIARY
18	LEE LAKE WATER DISTRICT RECHARGE TO BEDFORD SUBBASIN
19	RECYCLED WATER IRRIGATION (PARKS AND URBAN LANDSCAPE AS IN-LIEU PUMPING)
20	PURCHASE OF METROPOLITAN WATER DISTRICT (MWD) IN-LIEU WATER
21	PIPLELINE TO CONVEY METROPOLITAN WATER DISTRICT (MWD) IN-LIEU WATER TO BORDER AVENUE RECYCLED WATER RESERVOIR
22	LINCOLN AND COTA STREET PERCOLATION PONDS MAINTENANCE PROGRAM

AKM JOB No. 760683.00

AKM Consulting Engineers
553 Wald
Irvine, Ca. 92618
(949) 753-7333

CITY OF CORONA

GROUND WATER MANAGEMENT PLAN

POTENTIAL GROUNDWATER MANAGEMENT STRATEGIES

FIGURE 37

n:\0760 Corona\683 Ground Water Manangement Plan\Groundwtr_Pln.dgn 4/22/2008

Appendix A
Public Notice and Outreach

PUBLIC NOTICES

THE PRESS-ENTERPRISE PE.com

Publication date: June 6, 2006.

YOU SHOULD KNOW....

The Press-Enterprise public notices serve to notice the entire community that an important government function is being carried out. This includes governmental events, activities, contracting, and other transactions of interest to every citizen. The Press-Enterprise public notices are a permanent record and source of information for the entire community.

CITATION TO APPEAR
Case No. RIJ-109375
SUPERIOR COURT OF THE STATE OF CALIFORNIA COUNTY OF RIVERSIDE, JUVENILE DIVISION

In re the Matter of:
HANNAH MARIE ROPER,
(dob: 09/07/99)
a Minor(s)

THE PEOPLE OF THE STATE OF CALIFORNIA

TO: THE UNKNOWN FATHER, AND ANYONE CLAIMING TO BE THE FATHER OF THE ABOVE STATED MINOR:

By order of this Court you are hereby cited and required to appear before a Judge of the Superior Court, located at 9991 County Farm Road, Riverside, California on August 9, 2006, at 8:00 a.m., in Department J-3, to show cause, if any, why the above-named minor(s) should not be declared free from the custody and control of her parents, pursuant to a hearing held in accordance with **Welfare and Institutions Code** Section 366.26. This hearing is for the purpose of terminating your parental rights forever and ordering that the minor be placed for adoption.

You are hereby notified of the following provisions of Welfare and Institutions Code:

Section 366.26(e) (2) provides that: "If you appear without counsel and are unable to afford counsel, the Court shall appoint counsel for you, unless such representation is knowingly and intelligently waived."

Section 366.26 provides: "The Court may continue the proceeding for a period not to exceed 30 days as necessary to appoint you counsel, and to enable counsel to become acquainted with your case."

Section 366.26(b) (1) provides: "At the hearing....the court....shall do one of the following: (1) Permanently sever your parental rights and order that the child be placed for adoption; (2) Without permanently terminating your parental rights, appoint a legal guardian for the minor and issue letters of guardianship; or (3) Order that the minor be placed in long-term foster care, subject to the regular review of the juvenile court."

Given under my hand and seal of the Superior Court of the County of Riverside, State of California, this 24th day of May 2006.

(SEAL)
INGA McELYEA
Executive Officer
Superior Court of the State California, in and for the County of Riverside.
By: , Deputy
JOE S. RANK
County Counsel
Lilia Wilkerson
Deputy County Counsel
9991 County Farm Road, Suite 113
Riverside, California, 92503
Telephone: 951-358-4125
Attorneys for the Petitioner Department of Public Social Services
6/6,13,20,27

CITY OF CORONA NOTICE OF PROPOSED RESOLUTION OF INTENTION TO DRAFT A

GROUNDWATER MANAGEMENT PLAN FOR CITY OF CORONA DEPARTMENT OF WATER & POWER

NOTICE IS HEREBY GIVEN that at 7:00 p.m. on June 21, 2006, at City Hall, Council Chamber, 400 S. Vicentia Avenue, Corona, CA, a public hearing will be held to discuss whether or not the City of Corona, Department of Water & Power should adopt a resolution of intention to draft a groundwater management plan.

Section 10753 of the Californian Water Code permits the adoption and implementation of groundwater management plans to encourage authorized local agencies to manage groundwater resources within their service areas.

Landowners within the City of Corona and other interested parties are invited to attend the hearing. Copies of the proposed resolution and other relevant written materials will be available for review by the public at the hearing or may be obtained in advanced at the Department of Water & Power, 400 S. Vicentia Avenue, Corona, CA. Opportunity for public questions/input will be provided at the hearing.

In compliance with Water Code §10753.4 (b), landowners and other interested parties who wish to participate in developing the groundwater management plan may do so by attending the hearing, and indicating their interest, or by submitting a written letter to:

Asad Korgan,
Strategic Planning Manager
400 S. Vicentia Avenue,
Corona, CA 92882-2187

In compliance with the Americans with Disabilities Act, if you need special assistance to participate in this meeting, please contact the Building and Safety Director, (951) 736-2250. Notification 48 hours prior to the meeting will enable the City to make reasonable arrangements to ensure accessibility to this meeting.

The public is invited to attend and comment on the applications described above. Due to time constraints and the number of persons wishing to give oral testimony, each speaker will be limited to three minutes. You may make written comments and submit them to the City Clerk for inclusion into the public record. If you challenge any portion of these projects in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered at, or prior to the public hearing. Any person unable to attend the public hearing may submit written comments to the City Clerk, 400 S. Vicentia Avenue, Corona, CA 92882. If you have questions regarding this notice or the applications to be heard, please call the City Clerk's Office at (951) 736-2201.

For additional information pertaining to the Groundwater Management Plan, please call Asad Korgan at (951) 736-2230.
6/6,13

Corona-Norco Unified School District NOTICE OF PUBLIC HEARING

A public hearing by the Governing Board of the **Corona-Norco Unified** School District will be held prior to the adoption of the 2006-2007 budget. Such hearing will be held at **CNUSD-BOard Room 2820 Clark Avenue, Norco, CA** on **June 20**, 2006, at 6:35 p.m.. The budget will be available for public inspection between **June 7** and **June 20** at the following location(s):

Boulevard, Moreno Valley, California (business address) no later than
2:00 P.M. on JUNE 14, 2006

Proposals shall be in accordance with plans, specifications, other contract documents prepared by the Moreno Valley Unified School District and WLC Architects, Inc.

PROSPECTIVE BIDDERS WHO DID NOT ATTEND THE MANDATORY JOB WALK ON MAY 31 MUST SCHEDULE A JOB WALK WITH ROGER GAY AT WLC ARCHITECTS, (909) 987-0909, **NO LATER THAN JUNE 7, 2006.**

Prospective general contract bidders may secure up to three sets of said documents from the Office of WLC Architects, Inc., 10470 Foothill Blvd., Virginia Dare Tower, Rancho Cucamonga, CA 91730 (909) 987-0909, upon payment of a deposit of Seventy Five Dollars ($75.00) per set. **Deposits will be refunded upon the return of said documents in good condition within seven (7) days after bids on the project have been opened.** A non-refundable mailing charge of Twenty Dollars ($20.00) will be required for each set mailed to California cities.

Prospective subcontract bidders may secure one set of said documents from the office of WLC Architects, Inc., 10470 Foothill Blvd., Virginia Dare Tower, Rancho Cucamonga, California 91730 (909) 987-0909, upon non-refundable payment of Seventy Five Dollars ($75.00) per set. A non-refundable mailing charge of Twenty Dollars ($20.00) will be required for each set mailed to California cities.

For information regarding this project, prospective bidders are requested to contact Roger P. Gay, Project Manager at WLC Architects, Inc.

The Board of Education reserves the right to reject any or all bids, or any or all items of any bid, and to waive any informality on a bid.

Pursuant to Section 22300 of the Public Contract Code of the State of California, the contract will contain provisions permitting the successful bidder to substitute securities for any moneys withheld by the District to ensure performance under this contract.

Pursuant to the Labor Code, the governing board of the Owner has obtained from the Director of the Department of Industrial Relations, State of California, his determinations of per diem wages applicable to the work, and for holiday and overtime work, including employer payments for health and welfare, pension, vacation and similar purposes, as set forth on schedule which is on file at the principal office of the Owner, and which will be made available to any interested person upon request.

The bid shall be accompanied by the security referred to in the contract documents and the list of proposed subcontractors. **ALL BOND SURETIES MUST BE ADMITTED SURETIES LICENSED TO DO BUSINESS IN THE STATE OF CALIFORNIA AND MUST HAVE A FEDERAL TREASURY LISTING IN THE FEDERAL REGISTER WHICH EQUALS OR EXCEEDS THE BONDING AMOUNT. NO PERSONAL SURETIES WILL BE ACCEPTED.**

This Project is a "public work" as defined within California Labor Code Section 1720 and is subject to the requirement to pay prevailing wages to all workers on the "public work" without

der must maintain the license throughout the duration of this contract.

In accordance with Section 1773.2 of the California Labor Code, the Contractor shall post a copy of the determination of prevailing rate of wages at each job site.

It shall be mandatory upon the Contractor to whom the contract is awarded, and upon any subcontractors under him, to pay not less than the said prevailing rates to all workmen employed by them in the execution of this contract.

No bidder may withdraw his bid for a period of forty-five (45) days after the date set for the opening of bids.

As an equal opportunity employer, the District requires that all of its prospective contractors or bidders comply with the intent of the "equal opportunity clause" as set forth in Form HEA-514 (4-69). Contractor shall not discriminate in its recruiting, hiring, promotion, demotion or termination practices on the basis of race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status or sex in the performance of this contract, and, to the extent they shall be found to apply hereto, shall comply with the provisions of the California Fair Employment Practices Acts (commencing with Section 1410 of the Labor Code), and the Federal Civil Rights Act of 1964 (P.O. 88-352).

The Moreno Valley Unified School District encourages vendors and contractors (subcontractors) representing the demographics of the local and surrounding community to actively pursue business opportunities with the School District. In order to advocate this participation, the District advertises requests/bids in newspapers and publications whose circulation reflects the various demographic groups of the local and surrounding community.

Assistant Superintendent
Bid packet Legal Counsel
approved 11/89
Bid Opening:
2:00 p.m., June 14, 2006
6/6

MORENO VALLEY UNIFIED SCHOOL DISTRICT
25634 Alessandro Blvd.
Moreno Valley, California 92553
(951) 571-7535

NOTICE INVITING BIDS REVISED NOTICE DUE TO ADVERTISING ERROR

Moreno Valley Unified School District, herein called OWNER, invites sealed proposals for:

SUNNYMEADOWS ELEMENTARY SCHOOL REPAIRS (BUILDING A AND B ONLY) LICENSE REQUIRED IS B OR C-5

Proposals for these bids shall be delivered to the District Office, 25634 Alessandro Boulevard, Moreno Valley, California (business address) no later than
2:00 P.M. on JUNE 15, 2006

PROSPECTIVE BIDDERS WHO DID NOT ATTEND THE MANDATORY JOB WALK ON JUNE 1 MUST CALL ROGER GAY AT WLC ARCHITECTS, (909) 987-0909, **NO LATER THEN JUNE 7, 2006,** TO SCHEDULE A JOB WALK.

Proposals shall be in accordance with plans, specifications, other contract documents prepared by the Moreno Valley Unified School District and WLC Architects, Inc.

Prospective general contract bidders may secure up to

be required for each set mailed to California cities.

For information regarding this project, prospective bidders are requested to contact Roger P. Gay, project Manager at WLC Architects, Inc.

The Board of Education reserves the right to reject any or all bids, or any or all items of any bid, and to waive any informality on a bid.

Pursuant to Section 22300 of the Public Contract Code of the State of California, the contract will contain provisions permitting the successful bidder to substitute securities for any moneys withheld by the District to ensure performance under this contract.

Pursuant to the Labor Code, the governing board of the Owner has obtained from the Director of the Department of Industrial Relations, State of California, his determinations of per diem wages applicable to the work, and for holiday and overtime work, including employer payments for health and welfare, pension, vacation and similar purposes, as set forth on schedule which is on file at the principal office of the Owner, and which will be made available to any interested person upon request.

The bid shall be accompanied by the security referred to in the contract documents and the list of proposed subcontractors. **ALL BOND SURETIES MUST BE ADMITTED SURETIES LICENSED TO DO BUSINESS IN THE STATE OF CALIFORNIA AND MUST HAVE A FEDERAL TREASURY LISTING IN THE FEDERAL REGISTER WHICH EQUALS OR EXCEEDS THE BONDING AMOUNT. NO PERSONAL SURETIES WILL BE ACCEPTED.**

This Project is a "public work" as defined within California Labor Code Section 1720 and is subject to the requirement to pay prevailing wages to all workers on the "public work" without exception.

A payment bond and performance bond will be required of the General Contractor prior to the execution of the contract. In addition, a performance bond will be required of all subcontractor providing goods and services in excess of $15,000.00. These bonds shall be in the form and amount set forth in the Contract Documents.

In accordance with provisions of Public Contract Code Section 22300, substitution of eligible and equivalent securities for any monies withheld to ensure performance under this contract will be permitted at the request and expense of the Contractor.

Each bidder will possess at the time of bid, the applicable Contractor's license, pursuant to Public Contract Code Section 3300 and Business and Professions Code Section 7028.15. The successful bidder must maintain the license throughout the duration of this contract.

In accordance with Section 1773.2 of the California Labor Code, the Contractor shall post a copy of the determination of prevailing rate of wages at each job site.

It shall be mandatory upon the Contractor to whom the contract is awarded, and upon any subcontractors under him, to pay not less than the said prevailing rates to all workmen employed by them in the execution of this contract.

No bidder may withdraw his bid for a period of forty-five (45) days after the date set for the opening of bids.

As an equal opportunity employer, the District requires that all of its prospective contractors or bidders comply with

tion, demotion or termin
practices on the basis of
religious creed, color, nat
origin, ancestry, phy
handicap, medical cond
marital status or sex ir
performance of this con
and, to the extent they sh
found to apply hereto,
comply with the provisio
the California Fair Em
ment Practices
(commencing with Se
1410 of the Labor Code)
the Federal Civil Rights
1964 (P.O. 88-352).
The Moreno Valley U
School District encou
vendors and contractors
contractors) representin
demographics of the loca
surrounding community
actively pursue busines
portunities with the S
District. In order to adv
this participation, the Di
advertises requests/bi
newspapers and public
whose circulation reflec
various demographic g
of the local and surrou
community.
Assistant Superintenden
Bid packet Legal Couns
approved 11/89
Bid Opening:
2:00 p.m., June 15, 2006

NOTICE INVITING B

School District: C
Norco Unified School D
of Riverside County, Cal
(hereinafter, "DISTRICT
Bid Deadline: 3:00
p.m. of the 20th day June
Bid Opening: 3:00
p.m. of the 20th day of
2006.
Place of Bid Recei
Opening: Business S
Office, 2820 Clark A
Norco, California 92860
Bid Identification
Bid Number 2005/06-G
dustrial Technology
ment and Software
Roosevelt High School
NOTICE IS HE
GIVEN that the DIS
acting by and through
erning Board, will rece
to, but not later than the
stated time, sealed bids
award of a Contract
above referenced bid.
Bids shall be receive
place identified abov
shall be opened and
read aloud at the above
time and place.
All work, equipment
supplies must be de
within **Thirty** (30) cons
calendar days from the
the notice issued by t
TRICT. Time is of the e
Failure to deliver the
ment and/or supplies
the time set forth here
constitute a breach of
for which the DISTRI
exercise any equitable
legal remedies availab
Each Bid must confc
be responsive to the
Documents.
Pursuant to Public
Code Sections 2011
20652, the Bidder ma
other public entities
State of California to p
equipment and supplie
the same terms
conditions.
The DISTRICT rese
right to reject any and
or to waive any irregul
informalities in any b
the bidding.
No Bidder may w
any bid for a period of
days after the date se
opening of bids.
Governing Board
CORONA-NORCO UN
SCHOOL DISTRICT
Date: June 2, 2006
By: (Rosalie Aid)
Purchasing Manager

NOTICE INVITING

Bids will be opened in
forum at 2:00 P.M. on
2006 for **PROJECT**
Tract 31330 Winches
Storm Drain Impro

RESOLUTION NO. 2006-074

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, APPROVING A NOTICE OF INTENTION FOR THE CITY OF CORONA DEPARTMENT OF WATER & POWER TO DRAFT A GROUNDWATER MANAGEMENT PLAN

WHEREAS, adoption of a Groundwater Management Plan is in furtherance of and consistent with the City's Water Master Plan as adopted by the City Council; and

WHEREAS, Section 10753 of the California Water Code permits the adoption and implementation of groundwater management plans to encourage authorized local agencies to manage groundwater resources within their services areas; and

WHEREAS, the City of Corona Department of Water & Power (CDWP) is an authorized local agency and may, therefore, adopt and implement such a Groundwater Management Plan; and

WHEREAS, a Public Notice of Intention was published in a newspaper of general circulation on June 6, 2006, and on June 13, 2006, announcing the City's intention to consider the adoption of a resolution of intention to draft a Groundwater Management Plan in accordance with the California Water Code Section 10753.2 and California Government Code Section 6066; and

WHEREAS, a public hearing was held on June 21, 2006, to discuss the adoption and implementation of a Groundwater Management Plan in accordance with California Water Code Section 10753.2; and

WHEREAS, the City Council believes the groundwater can best be managed, as in the past, by CDWP in coordination with owners of properties overlying the groundwater basin; and

WHEREAS, the City Council believes the adoption of a Groundwater Management Plan will be in the best interest of the city's property owners and water users and can help meet the projected long-term water needs of the City.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Corona, California, as follows:

Section 1: It is the intention of CDWP to draft a Groundwater Management Plan in accordance with Section 10753.4 of the California Water Code, and CDWP's consultant is hereby authorized and directed to draft such plan.

Section 2: This Resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2.

Section 3: The CDWP is authorized and directed to publish this resolution of intention to draft a Groundwater Management Plan in accordance with the provisions of California Water Code Section 10753.3 and to provide interested persons with a copy of this Resolution upon written request.

Section 4: The City Council hereby authorizes the CDWP General Manager to execute all documents and take any other action necessary or advisable to carry out the purpose of this Resolution.

Section 5: After the Groundwater Management Plan has been prepared, CDWP will conduct a second public hearing in accordance with California Water Code Section 10753.5, et seq. to determine whether to adopt the plan.

ADOPTED this 21st day of June 2006.

Karen Spiegel

Mayor of the City of Corona, California

ATTEST:

Victoria J. Wood

City Clerk of the City of Corona, California

CERTIFICATION

I, VICTORIA J. WASKO, City Clerk of the City of Corona, California, do hereby certify that the foregoing Resolution was passed and adopted by the City Council of the City of Corona, California, at a regular adjourned meeting held on the 21st day of June 2006, by the following vote of the Council:

AYES:	**MILLER, MONTANEZ, NOLAN, SPIEGEL, TALBERT**
NOES:	**NONE**
ABSENT:	**NONE**
ABSTAINED:	**NONE**

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Corona, California, this 21st day of June 2006.

Victoria J. Wasko
City Clerk of the City of Corona, California

(SEAL)

DEPARTMENT OF WATER & POWER
"Protecting Public Health"
General Manager's Office

(951) 279-3692 730 Corporation Yard Way Corona, California 92880

PRESS RELEASE

June 5, 2008
For Immediate Release
Contact: Matthew Bates, Utility Engineer, (951) 279-3692

Corona Groundwater Management Plan

As part of the City's on-going efforts to efficiently manage its finite water resources, the Corona Department of Water and Power contracted with AKM Consulting Engineers and Todd Engineering in January 2006 to prepare an Assembly Bill 3030 compliant Groundwater Management Plan (GWMP). The Plan recommends approaches the City can utilize to increase the efficient usage of its groundwater to ensure its availability in the future.

AKM Consulting Engineers and Todd Engineering recently completed the Plan and the Department of Water and Power will recommend its adoption at the City Council meeting on June 18th, 2008 at 7:00 p.m. in Council Chambers.

If you have any questions or require additional information regarding the Plan, please contact Matthew Bates, Utility Engineer at (951) 279-3692.

#####

Table A-1
List of Potential Stakeholders
City of Corona Groundwater Management Plan

Stakeholder Organization	Contact			Title	Address	City	State	Zip Code
County of Orange	Ms.	Angela	Burrell	Public Information Officer	PO Box 4048	Santa Ana	CA	92702-4048
Riverside County Flood Control District	Mr.	Steve	Stump	Chief of Operations and Maintenance	1995 Market Street	Riverside	CA	92501
City of Norco	Mr.	Bill	Thompson	Director of Public Works	2870 Clark Avenue	Norco	CA	92860
Dept. of Environmental Health	Mr.	Damien	Meins	Deputy Director	4080 Lemon Street, 9th Floor	Riverside	CA	92501
City of Riverside, Planning Division	Ms.	Diane	Jenkins		3900 Main St., 4th Floor	Riverside	CA	92501
Santa Ana Watershed Project Authority	Mr.	Eldon	Horst		11615 Sterling Avenue	Riverside	CA	92503
Santa Ana Region	Mr.	Gerard	Thibeault	Regional Water Quality Control Board	3737 Main Street, Ste. 500	Riverside	CA	92501
Riverside County Waste Management Dept.	Mr.	Hans	Kernkamp	General Manager	14310 Frederick Street	Moreno Valley	CA	92553
Lee Lake Water District	Mr.	Jeff	Pape	General Manager	22646 Temescal Canyon Road	Corona	CA	92883
Western Municipal Water District	Mr.	John	Rossi	General Manager	PO Box 5286	Riverside	CA	92508
Chandler's Sand & Gravel & Temescal Mining LLC	Mr.	John	Robertson	Vice President & General Manager	PO Box 295	Lomita	CA	90717
Municipal Water District of Orange County	Ms.	Karen	Warren	Assistant to the General Manager	PO Box 20895	Fountain Valley	CA	92728
Chino Basin Water master	Mr.	Kenneth	Manning	CEO	9641 San Bernardino Road	Rancho Cucamonga	CA	91730
Orange County Resources & Development Mgmt Dept.	Mr.	Nadeem H.	Majaj, P.E.	Manager, Flood Control Division	PO Box 4048	Santa Ana	CA	92702-4048
Mission Clay Products	Mr.	Owen	Garret		PO Box 549	Corona	CA	92878
Elsinore Valley Municipal Water District	Mr.	Ron	Young	General Manager	31315 Chaney Street	Lake Elsinore	CA	92530
City of Riverside, Planning Division	Mr.	Craig	Aaron		3900 Main Street	Riverside	CA	92522
Santa Ana Watershed Project Authority	Mr.	Mark	Norton		11615 Sterling Avenue	Riverside	CA	92503
Western Municipal Water District	Mr.	Jeff	Sims		PO Box 5286	Riverside	CA	92517

Appendix B
Monitoring Program and Protocols

Appendix B – Monitoring Program and Protocols

B-1 Introduction

One of the groundwater management strategies (Strategy 8) presented in this GWMP is an improved groundwater monitoring program capable of characterizing groundwater conditions in the subbasins of interest and tracking future changes in water levels, water quality, and groundwater storage. This appendix documents the City's current monitoring program and makes recommendations for improvements going forward.

B-2 Background

The City has monitored water quality in production wells in the Temescal, Coldwater, and Bedford subbasins to ensure a high quality supply and to comply with regulations over time. Since 1998, the City has conducted a more formal monitoring program including water level measurements in about 23 production wells and maintaining these data in a water level database. Data on water levels in City production wells dating back to 1994 have been provided to a consultant for the Santa Ana River Watermaster (Watermaster Support Services). This firm provided these data in a publicly-available database to Todd Engineers in support of this project. Those data have been combined with other water level data and entered into the City's Data Management System (DMS) constructed for this GWMP. Although the City water level data were noted as being measured either during pumping or non-pumping (static) conditions, some static measurements have been overly influenced by well drawdowns and indicate that the well had not completely recovered when levels were recorded. In addition, some of the noted pumping water levels appear to correlate more closely to static water levels in other wells. In addition, surveyed reference elevations are not always recorded for a well.

Over the last two years, the City expanded the water level monitoring program to include wells that are not currently pumping (or pump on a limited basis). These wells are a combination of inactive irrigation wells, inactive or periodically-used production wells, and dedicated monitoring wells installed by the City. These data are less influenced by pumping and are more representative of overall subbasin conditions. In connection with this GWMP, the City wishes to document and formalize the monitoring program and consider additional improvements to the program over time.

B-3 Objectives of Monitoring Program

Objectives of the monitoring program include the following:

- characterize water levels and water quality in various aquifers across the subbasins

- monitor areas of concern to continue to address specific problems
- evaluate the performance of groundwater management activities
- track changes in groundwater levels, quality, and storage over time.

The spatial distribution of the monitoring points should focus on key areas based on specific subbasin hydrogeologic conditions. In addition, the program should maintain an element of random locations to allow for the identification of unanticipated changes within the system. To achieve these objectives, protocols of the monitoring program including the locations, measurements, equipment, frequencies, and constituents to be monitored are reviewed below. This program is evaluated with respect to the hydrogeologic conditions described in Chapter 3 of the GWMP and recommendations are made for program improvements.

B-4 Current Groundwater Monitoring Program

The City maintains a groundwater monitoring program consisting of about 39 wells, 21 of which are active production wells owned and operated by the City for drinking water supply. The remaining 18 wells are a combination of inactive production wells and wells installed specifically for monitoring groundwater conditions. For the purposes of this discussion, the 18 wells are referred to as monitoring wells and the 21 wells in the City's system are referred to as City production wells. The selection of monitoring locations has generally been based on the following criteria:

- Availability of unused wells owned by others
- Easy access to wells
- Ability to physically access the well with a sounder or sampling pump/bailer
- Well screens across aquifer of interest
- Well location monitors specific activity of interest (e.g., installed for a pilot test for enhanced recharge)
- Network spatially distributed throughout the subbasins of interest.

Wells included in the monitoring program are shown on Figure B-1 with the City's active production wells identified separately. For the purposes of this discussion, the wells in the monitoring program that are not wells in the City's active production water system are referred to as monitoring wells. Well data and monitoring components are summarized in Table B-1.

B-4.1. Water Levels

As shown on Figure B-1, the 18 monitoring wells are located in about eight separate locations with more than one well at four locations. Clusters of four monitoring wells are located near City production Well 11, Oak Avenue Detention Basin, and Main Street Detention Basin. Two wells are located in the eastern arm at Arlington Gap.

The monitoring and production wells in the water level monitoring program are well distributed across Temescal Subbasin and cover most key areas (Figure B-1). Nine of the monitoring wells track water levels in or near the Channel Aquifer along with most of the production wells. Two inactive production wells owned by Home Gardens County Water District allow the City to share water level data. These are key wells located near the Arlington Gap and provide data for the assessment of groundwater storage and the subbasin water balance. In addition, shallow monitoring wells have been drilled in the Oak Avenue and Main Street detention basins in the upland portion of the alluvial fan in Temescal Subbasin.

Water levels at the downgradient extent of Bedford Subbasin are monitored by the irrigation well at Dos Lagos. No dedicated monitoring wells are currently located in the Coldwater Subbasin, but the City is making attempts to locate a former state monitoring well to track water levels there. Currently, water levels in the Coldwater Subbasin are available from City production wells.

Water levels are measured at each of the 18 monitoring wells on a monthly basis. The City uses an electric sounding probe for measuring depth to water in most of the wells. For the Home Gardens Well 5, data are available from a transducer pressure gauge. Depth-to-water measurements are made by City personnel on an established field monitoring form. Also recorded are the status of the well (pumping or not), the date, and the initials of the field person.

B-4.2. Water Quality

Groundwater quality monitoring has occurred at the City's active production wells, providing extensive water quality data in the Channel Aquifer. To date, no formal water quality monitoring program has been established at the monitoring wells, primarily because of an inability to pump some of the wells. The high concentration of water quality monitoring in the Channel Aquifer is appropriate given the unconfined nature of the aquifer and the City's reliance on the aquifer for its drinking water supply.

More than 7,400 records of water quality analyses from 1948 through 2004 were compiled for 25 City wells (including historical data from now-abandoned wells) and entered into the GWMP DMS. Currently, groundwater sampling occurs in all active production wells (Table B-1).

The laboratory analyses of groundwater samples include constituents set forth in Title 22 of the California Code of Regulations in compliance with federal standards and state regulations. These constituents allow for testing of both inorganic and organic chemicals of concern in the subbasins. These data are summarized in Consumer Confidence Reports provided to City water users.

B-4.3. Groundwater Storage

Changes in groundwater storage as estimated in this GWMP were based primarily on an assessment of individual water balance inflows and outflows. The resulting change in storage was compared to changes in water levels in production wells for reasonableness. In the future, this assessment can be improved by comparing the water balance results to water level contour maps that depict change in groundwater storage over the entire subbasin based on data from monitoring wells. This assessment removes the near-wellbore effects of pumping from the analysis of changes in water levels over time. The current monitoring program is not sufficient to conduct such a detailed assessment, but the addition of dedicated non-pumping wells to the program is a step in the right direction. Increased monitoring at non-pumping wells, including City wells that have been turned off sufficiently long for water level recovery, will also improve the City's ability to track changes in groundwater storage over time.

B-5 Surface Water Monitoring Program

Releases to Temescal Wash are monitored by various dischargers through NPDES permit requirements. One active stream gage in the City is monitored by local agencies (11072100, Figure 7 in the GWMP figures). Streamflow data are generally unavailable on Temescal Wash as it enters and exits Bedford Subbasin and as it enters Temescal Subbasin. Improved gaging in these areas could assist in developing a water balance for Bedford Subbasin and improving the water balance analysis in Temescal Subbasin.

As Temescal Wash enters the Prado Management Area, a surface water sampling station is maintained by Orange County Water District. Other stream gage data are available from additional flows into the management area to account for surface outflow at Prado Dam. Additional streamflow measurements by the City in this area seems unnecessary at this time.

Pool elevation data from the Prado Management Area allow for the assessment of rising groundwater that is considered subsurface outflow from the Temescal Subbasin water balance. More detailed data likely exist for this area than were compiled for the GWMP. Additional data compiled from this area could allow for a more detailed assessment of basin outflow than estimated from the groundwater flow model in this analysis. The City is in the process of assessing outflow conditions in connection with a hydrogeologic characterization for their wastewater percolation ponds. Data from this study should be incorporated into the DMS for future assessments of subbasin outflow.

B-6 Land Subsidence Monitoring

Excessive groundwater pumping in certain aquifer systems can cause subsurface compaction, resulting in subsidence of the overlying land surface. Land subsidence resulting from overdraft conditions has been documented throughout the state including the Santa Clara Valley and Central Valley of California. The most susceptible systems contain sufficient thickness of semiconsolidated silt and clay layers (aquitards) that can result in a vast one-time release of "water of compaction" (Galloway, et al., 1999). As this water is permanently released from the structure of the fine-grained units, the layers collapse, impacting overlying units and reducing the storage capacity of the aquifer system.

Land subsidence in the form of ground fissuring has been identified in the adjacent Chino Groundwater Basin since the 1970s. The susceptible area is located about 2.5 miles north of the Prado Management Area (WE, 2006). An extensometer and other monitoring techniques have been employed to track land subsidence in this area.

To our knowledge, neither land subsidence nor ground fissuring have been identified as issues in the Temescal, Bedford, or Coldwater subbasins. The absence of thick, fine-grained aquitards in these areas suggest that land subsidence should not be a concern. The Channel Aquifer contains very little fine-grained sediments as confirmed by lithologic logs and the few geophysical logs in the subbasin. Fine-grained units are likely more predominant in the distal portions of the Temescal Subbasin alluvial fan, south and southwest of the City's current production wells. If the City develops groundwater on the Temescal Subbasin alluvial fan, the potential for land subsidence should be considered. In the Coldwater Subbasin, production wells are located in the proximal and mid-fan portions of a large alluvial fan characterized by coarse-grained sediments. Gravel mining down to 300 feet confirms the nature of these aquifers.

In consideration of these conditions, land subsidence monitoring does not appear to be an issue for the City and is not recommended for expansion of the monitoring program at this time. The City will investigate any reports of ground fissures and consider ground surface monitoring if land subsidence is identified as a potential concern in the future.

B-7 Recommendations for Monitoring Program Improvements

The City will continue to make improvements to their monitoring program as groundwater management strategies are implemented over the next two years. Ongoing efforts include the exploration and identification of additional wells for possible inclusion into the program. In particular, certain non-pumping wells are being researched in the Coldwater Subbasin for increased monitoring there.

B-7.1. Improvements in Spatial Distribution

The monitoring program should be sufficient to characterize water levels and quality throughout the subbasins and focus on key areas where data collection could prove most beneficial. In addition, the program should be scoped to include an element of random spacing to allow for detections of unanticipated changes. One strategy is to target key areas of subbasin inflows and outflows as identified by the subbasin water balance analysis. For the Temescal

Subbasin, inflows are evaluated by the wells in Arlington Gap and in the upland detention basins. Outflow areas are monitored by the wells at Butterfield Park and Corona High School. Additional inflow monitoring would be beneficial in the area where Temescal Wash enters the basin (south of Magnolia Avenue near All American Way) and the area with inflow from Norco (north of City production Well 26). Additional outflow monitoring could be accomplished with an additional well west of the City percolation ponds (in the vicinity of the Rincon Groundwater Treatment Project included in this GWMP as Strategy 3). With regard to the random element of spatial distribution, additional wells are needed on the slope of the alluvial fan to the south of current production wells.

In the Coldwater Subbasin, only production wells are currently available for monitoring. Since most of the production occurs in the southern half of the subbasin, it would be optimal to secure a monitoring point both in the south near production and in the north away from the wells to evaluate groundwater storage changes in the subbasin. A well just west of the Glen Ivy fault near Coldwater Wash would be most beneficial for also evaluating subsurface outflow across the fault plane. With respect to Bedford Subbasin, no wells currently exist in the southern portion of the subbasin and additional monitoring there would allow for better understanding of the subbasin groundwater system.

It would be helpful to add monitoring wells to the water quality monitoring program as analyses are currently conducted only in production wells. Extraction wells pull in large volumes of groundwater from a large area, which can mix and dilute specific chemicals of concern. Additional understanding of groundwater quality away from pumping wells would add significant value to the data collection efforts.

These improvements can be accomplished by securing access to existing wells or installation of new monitoring wells. If new wells are constructed, the diameter should be sufficiently large to allow for both groundwater level and quality monitoring.

B-7.2. Expanded List of Constituents for Analysis

For water quality monitoring, the list of constituents should be responsive to how the data are to be applied. For continued characterization of inorganic water chemistry and assistance with determining the source direction for groundwater types, the monitoring program should contain a full suite of cations and anions and a cation/anion balance. This analysis allows for the designation of water types and fingerprinting of groundwater in various parts of the basin. In addition, the analysis is cost effective and adds very little to the cost of monitoring already conducted by the City.

Because of the large number of underground storage tanks over the shallow and unconfined Channel Aquifer, additional constituents should be added to the monitoring program to ensure no impacts from leaking tanks. In particular, total petroleum hydrocarbons, benzene, toluene, ethylbenzene, xylenes, and methyl-tertiary butyl ether (MTBE) should be included. These analyses should be conducted on all wells for several sampling events to ensure no current impacts. After initial sampling, specific wells could be targeted for continued monitoring of these constituents.

B-7.3. Monitoring Frequency

A review of hydrographs indicates that water levels change seasonally and are most responsive to changes in groundwater pumping. In order to continue to characterize water level changes with monthly pumping patterns, water level monitoring should be conducted on a monthly basis.

Ambient groundwater quality is not expected to vary on a monthly basis and is less susceptible to seasonal changes. As such, annual to semi-annual monitoring seems sufficient for the groundwater quality monitoring program. Exceptions to this include areas where groundwater contamination has been identified as a threat to groundwater quality. These areas should be monitored more frequently to better understand the potential impacts as contaminants migrate downgradient. This increased frequency in monitoring will likely be conducted by the site responsible for the groundwater quality impact and may not result in increased monitoring by the City. However, the City should periodically acquire and review the monitoring data for incorporation into their DMS. Water quality monitoring at the active production wells will continue at the frequencies required for compliance with state regulations for drinking water supply.

B-7.4. Quality Assurance/Quality Control Measures

To ensure that data are properly collected and analyzed, a quality assurance/quality control (QA/QC) plan should be implemented for the monitoring program. This program would provide details on the equipment and sampling procedures for ensuring reliable data. For example, the City should continue and improve the use of monitoring data collection forms for both water levels and water quality. Key details from these forms such as sampling date, time, location, and conditions should be extracted from the forms and input into the City DMS. All water quality sampling should use clean, new containers specific to the constituent to be analyzed. Specific QA/QC samples should be taken (approximately one QA/QC sample per every ten monitoring samples) and all samples should be properly preserved in the field. Water quality sampling should follow standard QA/QC procedures specific to the constituents analyzed. All sampling events should contain a strict chain of custody procedure with proper chain of custody forms completed in the field. State-certified laboratories should be used for analyses. Data should be requested in both paper and electronic format from the laboratories to facilitate updating the DMS and minimize data-entry errors.

B-7.5. Summary of Recommendations

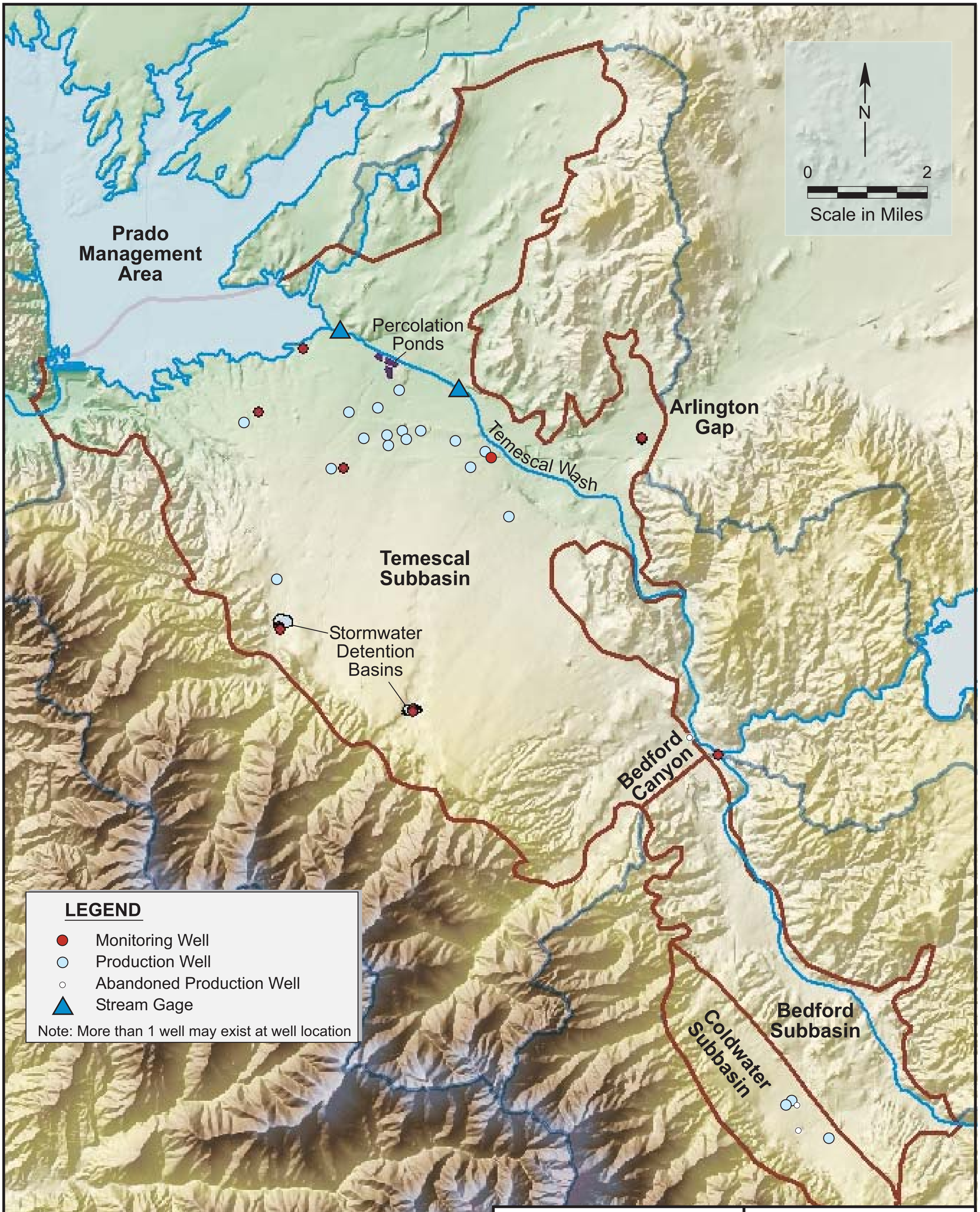
Recommendations for monitoring program improvements are summarized below.

- Continue to locate and add wells to the monitoring program with an emphasis on obtaining detailed construction data for any wells added to the program
- Increase locations in key inflow and outflow areas to improve the ability to depict changes in groundwater storage
- Add wells in any un-monitored areas of the subbasin to include a random component to the monitoring program
- Expand water quality sampling to monitoring wells
- Analyze water quality samples for a full suite of inorganic constituents to allow for fingerprinting of water types throughout the subbasins
- Conduct analyses for a full suite of inorganic chemicals to allow for geochemical plotting techniques for analysis
- Add petroleum hydrocarbon constituent including MTBE to ensure that leaking underground storage tanks have not impacted water quality
- Monitor water levels monthly and water quality annually to semi-annually for improved understanding of changes in groundwater conditions
- Implement a QA/QC program to ensure data reliability
- Re-evaluate the monitoring programs on an annual basis to determine if additional monitoring points are required or if duplicative data collection efforts can be eliminated.

The monitoring program will evolve over time and be modified for performance monitoring of specific management strategies as implemented. The program should be periodically evaluated to optimize the data collection efforts and achieve monitoring objectives.

Table B-1
City of Corona Monitoring Well Program

State Well Number	Well Owner	Well Name	Well No.	Date Drilled	Well Use	GSE ft, msl	Ref. Elev. ft, msl	Total Depth	Screen Depth Top ft	Screen Depth Bottom ft	Groundwater Monitoring Data: Water Levels	Water Quality	Groundwater Storage
MONITORING WELLS													
T04S/R07W-10	City of Corona	Oak Street Channel 1	OMW-1	10/29/2003	Monitoring	1023	1026	65	35	65	X		X
T04S/R07W-10	City of Corona	Oak Street Channel 2	OMW-2	10/14/2003	Monitoring	1024	1026	1070	100	200	X		X
T04S/R07W-10	City of Corona	Oak Street Channel 3	OMW-3	10/30/2003	Monitoring	1020	1022	70	40	70	X		X
T04S/R07W-10	City of Corona	Oak Street Channel 4	OMW-4	10/16/2003	Monitoring	1020	1022	200	100	200	X		X
T04S/R07W-13	City of Corona	Main Street Channel 1	MMW-1	10/247/03	Monitoring	1249	1252	420	20	400	X		X
T04S/R07W-13	City of Corona	Main Street Channel 2	MMW-2	10/22/2003	Monitoring	1244	1246	500	20	400	X		X
T04S/R07W-13	City of Corona	Main Street Channel 3	MMW-3	10/21/2003	Monitoring	1248	1250	260	20	260	X		X
T04S/R07W-13	City of Corona	Main Street Channel 4	MMW-4	10/22/2003	Monitoring	1237	1240	400	20	400	X		X
T04S/R06W-16	Canyon Properties	Dos Lagos Golf Course	IW-1		Standby Irrigation	799					X		X
T03S/R06W-28M2	Home Gardens County Water District	Home Gardens 1	HG-1	1/1/1927	Production	666	668	165			X		X
T03S/R06W-28M	Home Gardens County Water District	Home Gardens 5	HG-5	5/10/1988	Production	666	669	500	330	495	X		X
T03S/R07W-35	Joy Street Water Company	Corona High Parking Lot	CHS-1		Inactive Irrigation	730					X		X
T03S/R07W-27	City of Corona	Well 11 Gate West	11MW-1		Monitoring	645					X		X
T03S/R07W-27	City of Corona	Well 11 Gate South	11MW-2		Monitoring	645					X		X
T03S/R07W-27	City of Corona	Well 11 Gate East	11MW-3		Monitoring	645					X		X
T03S/R07W-27	City of Corona	Well 11 Gate North	11MW-4		Monitoring	645					X		X
T03S/R07W-22	City of Corona	Butterfield Park	BP-1		Standby Irrigation	597					X		X
T03S/R06W-30N	City of Corona	City Park	CP-1		Standby Irrigation	657		140			X		X
PRODUCTION WELLS													
T05S/R06W-03K01	City of Corona	Well No. 3	3	1/26/1935	Active Production	1141		543	100	530	X	X	X
T03S/R06W-30N03S	City of Corona	Well No. 7A	7A	6/16/2002	Active Production	688		250	125	230	X	X	X
T03S/R07W-25J02S	City of Corona	Well No. 8A	8A	6/6/2002	Active Production	641		210	100	190	X	X	X
T03S/R07W-25M03S	City of Corona	Well No. 9A	9A	8/21/2002	Active Production	657		250	113	230	X	X	X
T03S/R07W-27G01	City of Corona	Well No. 11	11	11/20/1953	Active Production	660			126	234	X	X	X
T03S/R07W-27F02	City of Corona	Well No. 12A	12A	10/19/2000	Active Production	665		320	180	320	X	X	X
T03S/R06W-31K01	City of Corona	Well No. 13	13	1952	Active Production	728			152	260	X	X	X
T03S/R07W-35C01	City of Corona	Well No. 14	14	11/27/1936	Active Production	753		515	200	250	X	X	X
T03S/R07W-26G01	City of Corona	Well No. 15	15	4/13/1946	Active Production	633		220	108	204	X	X	X
T03S/R07W-27A01	City of Corona	Well No. 16	16	11/12/1980	Inactive Production	662		775	415	755	X	X	X
T03S/R06W-30N03S	City of Corona	Well No. 17A	17A	5/24/2002	Active Production	653		210	100	188	X	X	X
T03S/R07W-25L01	City of Corona	Well No. 19	19	5/11/1990	Active Production	615			100	210	X	X	X
T05S/R06W-11D01S	City of Corona	Well No. 20	20	10/02/1998	Active Production	1140		600	200	580	X	X	X
T05S/R06W-03J05S	City of Corona	Well No. 21	21	5/221998	Active Production	1120		600	200	580	X	X	X
T03S/R07W-26J03S	City of Corona	Well No. 22	22	12/20/1998	Active Production	672		410	150	390	X	X	X
T03S/R07W-25L02S	City of Corona	Well No. 23	23	10/21/1998	Active Production	640		560	180	540	X	X	X
T03S/R07W-25K02S	City of Corona	Well No. 24	24	11/18/1998	Active Production	633		450	200	450	X	X	X
T03S/R07W-25E02S	City of Corona	Well No. 25	25	2/13/1999	Active Production	645		210	90	190	X	X	X
T03S/R07W-25C03S	City of Corona	Well No. 26	26	3/12/1999	Active Production	570		448	90	446	X	X	X
T04S/R07W-01A01S	City of Corona	Well No. 27	27	4/28/1980	Active Production	954		545	288	530	X	X	X
T03S/R07W-26K S	City of Corona	Well No. 28	28	8/20/2003	Active Production	610		190	105	165	X	X	X



May 2008	**Figure B-1**
TODD ENGINEERS Alameda, California	**Current Monitoring Program City of Corona**

Appendix C
Model Development

Appendix C - Model Development

A numerical model was developed to assess and quantify the impacts of the management strategies in the Temescal Subbasin described in the Groundwater Management Plan (GWMP), Chapter 6. The model was constructed using data from 1990 through 2004. This Study Period was selected based on hydrologic conditions and climate, as discussed in Chapter 2. Calibration involved testing and changing model variables to better match observed water levels and estimated water budgets. The calibrated model was then used as a foundation for simulating future conditions. The future conditions included the expected buildout pumping, wastewater recharge, and return flows in the model, while repeating previously observed hydrologic conditions (i.e. recharge). This future baseline model was used to compare management scenarios for the Temescal Subbasin.

The groundwater system of the Temescal Subbasin was simulated using the finite difference numerical model, MODFLOW (McDonald and Harbaugh, 1983). Groundwater Vistas 4 was used as a pre and post processor. The model simulated the conceptual model and the water balance described in detail in GWMP Chapter 3.

C-1. Model Area

The numerical model area for layers 1 and 2 are shown on Figure C-1. The model differs slightly from the DWR defined basin (shown in yellow) due to several factors including adjustment of the area based on bedrock outcrops and possible groundwater divides. Specifically, the western and northwestern model area was moved slightly eastward to the contact of bedrock and the more permeable alluvial materials. The groundwater divide identified in Chapter 3 was used as the south model boundary. The Norco area was not included in the model area due to lack of available data. The contribution from the Norco area is simulated as a boundary condition. The model gird was rotated 30 degrees to align with the typical groundwater flow direction in the Channel Aquifer. The grid is made up of 4,470 active cells, each 500 feet by 500 feet. The active area and no-flow cells in the model are shown in Figure C-1. The transient part of the model simulates 1990 through 2004 with monthly stress periods.

C-2. Layers

The numerical model of the Temescal Subbasin is divided into two layers, as shown in Figure C-1. The base of layer 2, the bottom of the model, is defined by the underlying bedrock. The top of layer 1, the top of the model, is defined by the ground surface elevation from the USGS digital elevation model (DEM) files. The depth of layer 1 was set at the approximate base of the Channel Aquifer, estimated at 450 feet above mean sea level (msl).

C-3. Steady State Condition

The model begins with a steady state stress period. The steady state period assures that the initial heads in the model are internally consistent and mathematically sound. The steady state period is roughly based on 1989, a year characterized by little to no change in storage. The initial heads for the steady state condition are based on actual water level data from the late 1980s and early 1990s (Figure C-2). The contours were transformed into a continuous surface using GIS.

C-4. Boundary Conditions

A numerical model seeks to simulate a small portion of a larger system. To represent the interaction of Temescal Subbasin with the larger systems, boundaries were simulated using constant head, general head, and specified flux cells. In most cases, only limited data were available to document the inflow or outflow from these boundaries. The locations and types of boundaries selected are shown on Figure C-3. Changes made to these boundaries during calibration are discussed in the calibration section.

C-4.1. Specified Flux

Subsurface inflow from bedrock was simulated as specified flux along the western (Santa Ana Mountains) and eastern boundaries of the model. Estimates for total flow were derived from recharge calculations used in the water balance, Chapter 3, and adjusted during calibration. As the lag time between precipitation and recharge to the basin is uncertain, a steady state flux, constant over time, was used to simulate inflow. Inflow from the Santa Ana Mountains and the eastern bedrock outcrops was estimated at 721 AFY and 62 AFY respectively.

Inflow from the Norco area of the basin was also simulated as a steady state specified flux. Due to the low permeability in the area, the flow from Norco is expected to be small. However, the lack of recent water level data in the area made calculations uncertain. A simple flux calculation using Darcy's equation was used to estimate flow at 52 AFY, an amount held constant in the model.

Temescal Creek overlies the Temescal Subbasin in some reaches. The creek is in bedrock in the south, enters the subbasin west of Arlington Gap, and then flows in a concrete-lined channel to the Prado Management Area. The creek's contribution to groundwater recharge is limited to a small area north of Temescal Canyon as described in Chapter 3. Recharge here is estimated at 113 AFY; as such, this amount is simulated in the model as a specified flux. The monthly distribution ranges from 5 AF/month to 15 AF/month, lower in the summer months and higher during the rainy winter months.

C-4.2. Constant Head

The inflow or outflow from Arlington Gap was simulated using 14 constant head cells located on the eastern boundary of the model. The level of the constant head for each month was selected using water levels from Home Gardens Wells 3, 4 and Todd_0180 Well (data from SAWPA). Water level measurements from these three wells were infrequent and collected at various times over the Study Period. The water levels from these three wells were combined to compile a complete record of water levels for the constant head boundary. The head at the constant head cells were varied monthly based on available data.

The model-simulated flow across this boundary was compared to flow estimates calculated using Darcy's equation as discussed in Chapter 3. Based on Darcy’s equation, the flow into the basin through Arlington Gap was estimated as a steady annual average of 4,800 AFY. Using a range of gradients calculated from water levels in nearby wells over the entire period of record, the inflow was estimated to range between 2,225 AFY and 4,880 AFY over the Study Period.

C-4.3. General Head Boundary

The inflow or outflow from the basin through Prado Dam was simulated as a general head boundary, located along the northwestern boundary of the model. Interaction between the Santa Ana River and the Temescal Subbasin was assumed to be a no–flow boundary. The conductance of the general head boundary was adjusted during calibration. The water level of the general head boundary was derived from the elevation of the reservoir behind Prado Dam. These elevation data are available from 1999 to the present from the California Data Exchange Center. The average monthly elevation of the reservoir was used for the study period. During calibration the elevation was increased by five feet to better match water level measurements and outflow estimates. The model simulates annual outflow that varied from 3,944 AFY to 4,123 AFY.

C-5. Recharge

Recharge in the model simulated deep percolation from precipitation, irrigation return flows, wastewater, and stormwater. Areal recharge was based on the analysis prepared for the water balance in Chapter 3, simplified to include 15 zones of recharge representing different soils, land use, and percolation rates. The area of the zones varied over time as land use in the basin changed; the zones for the last year of the model are shown in Figure C-4. The return flows associated with each land use type were added to the rate of deep percolation. Recharge from return flows and deep percolation ranged from 902 AFY in 1996 to 14,269 AFY in 1993.

Wastewater was simulated by three cells in the northern part of the basin, shown in purple in Figure C-4. Annual wastewater totals were estimated in Chapter 3 using available data and population estimates from the City. As seasonal or monthly variation information was not available, an annual distribution was derived from the available water use data. It was assumed that months with higher water use (groundwater pumping and imported water) also indicated months with higher wastewater discharge. As such, wastewater percolation is expected to peak in the summer months June through August. The average monthly rate of wastewater recharge was based on the monthly urban water use distribution (Table C-1). The annual wastewater recharge ranged from 3,650 AFY to 9,474 AFY over the Study Period.

Two stormwater detention ponds located along Main Street and Oak Avenue are sources of increased recharge during winter months. The ponds capture excess runoff from the Santa Ana Mountains and detain this water until it can slowly be released to the stormwater system. The ponds are simulated by two recharge cells in the model, shown in light green on Figure C-4. As discussed in Chapter 3, the average annual inflow to the basin from these ponds was approximately 480 AFY. This volume was divided equally between the two ponds during the rainy winter months November through March.

C-6. Pumping

Twenty eight wells were active in the Temescal Subbasin between 1990 and 2004. Pumping in these wells was simulated in the model using the well package with monthly stress periods. Annual pumping data were available for all wells and monthly pumping amounts were available for some wells. To account for wells or time periods for which monthly pumping data were not available, estimates were derived by using an annual distribution based on use type (Table C-1). The urban monthly pumping distribution was based on the observed annual distribution of pumping wells with monthly data. For agricultural pumping, a monthly distribution was developed using the distribution of evapotranspiration less monthly precipitation over the year. Pumping occurred only in layer 1 in the model. The active wells are shown in Figure C-3 (flux pumping); total pumping ranged from 7,294 AFY to 20,112 AFY.

Table C-1

Monthly Pumping Distribution

Month	Urban	Agriculture
January	3%	0%
February	3%	0%
March	5%	6%
April	7%	10%
May	7%	13%
June	10%	14%
July	17%	15%
August	17%	15%
September	15%	11%
October	7%	7%
November	5%	5%
December	3%	2%

C-7. Aquifer Parameters

Hydraulic conductivity (K) was first estimated in the model and then adjusted through calibration. A total of nine zones of K values were originally defined. After calibration, the zones were simplified to three zones in layer 1 and two zones in layer 2. The layer 1 zones represented the Channel Aquifer, Norco area, and Alluvial Fan with K values of 125 feet/day, 20 feet/day, and 0.5 feet/day respectively. The layer 2 zones included the area directly below the channel and the deeper Alluvial Fan with K values of 60 feet/day and 0.5 feet/day respectively. These zones are shown in Figure C-5. The assumed ratio of horizontal conductivity to vertical conductivity was 10 to 1. A specific yield of 0.2 was selected for Channel Aquifer and 0.1 was used for all other areas.

C-8. Calibration

The conceptual model and water balance discussed in Chapter 3 was simulated as a numerical model. Variables including the volume of bedrock inflow, conductance and elevation of the Prado Dam boundary, hydraulic conductivity, and location of the channel sediments were adjusted to match water levels observed in target wells and the conceptual understanding of the water budget.

C-8.1. Targets

Eight wells were selected as calibration targets, based on available water level measurements over the Study Period and spatial distribution. Target wells are listed below and shown on Figure C-6. The City's water level monitoring over the Study Period occurred solely in the City's pumping municipal wells and it is uncertain if these data reflect pumping water levels or static water levels. While pumping wells generally are not included as model targets, a lack of any other consistent or reliable water level data prevented the addition of other targets. No wells with consistent water levels were available in the Alluvial Fan; however limited data were available near the stormwater ponds from Corona Well 27 in 2003. These data indicated water levels near 850 feet msl. Since very little production has occurred during the Study Period in this area, water levels in this area were assumed to be relatively stable. As such, a hypothetical target with constant water levels of 850 feet msl was developed to aid in calibration.

Table C-2

Targets Used in Model Calibration

TODD ID	Agency Name	Local Name
TODD_0347	City of Corona	27
TODD_0191	Home Gardens	3
TODD_0257	City of Corona	13
TODD_0738	City of Corona	8
TODD_0743	City of Corona	19
TODD_0783	City of Corona	15
TODD_0839	City of Corona	11
TODD_0923	City of Corona	14

The simulated and observed water levels for each target are shown on Figures C-7 and C-8. Water level contours at the end of the model simulation, December 2004, are shown on Figure C-9. Generally, simulated water levels showed a reasonable fit to the elevation and trend of observed water levels. Simulated water levels in wells located in the main part of the Channel Aquifer (Corona Wells 8, 11, 15, and 19) match the elevation and trends of the observed water levels. Simulated water levels on average are slightly higher than observed (by less than five feet). The observed water levels may be reflecting pumping water levels and not static water levels in the area. Simulated water levels in the target located on the edge of the northern portion of the channel, Corona Well 14, were similar to observed water levels.

Simulated water levels in the target located on the southern edge of the channel, Corona Well 13, are slightly lower than observed (about 10 feet). However, the simulated water levels match the overall trend of the observed water levels. Corona Well 13 is located near the outflow of Temescal Wash, an area of observed high water levels. This area is likely to be significantly more heterogeneous than modeled. However, detailed geologic information was not available to refine this area of the model.

Home Gardens Well 3 was included as a target, however, its close proximity to the constant head cells simulating Arlington Gap controlled the simulated water levels. The well was left as a target to check on the specified head of the boundary, rather than as an indication of model fit.

The final target was based on limited data from Corona Well 27. Data from this well were available only from March to October 2003. A constant water level of 850 feet msl over the entire time period was used to check the model fit in the area. The target showed a difference of about 13 feet between the simulated and estimated water levels. This difference is due, in part, to the constant water level estimated from limited data. The simulated water levels showed variation over the study period including a decline near the end of the time period.

A comparison of observed to simulated water levels is shown on Figure C-10. Ideally, simulated and observed water levels would fall along the 1:1 trend line on the chart. Overall, the observed water levels show more variability than the simulated water levels. This variability is most likely caused by pumping in or near the target wells. This local effect of pumping on the water levels is not simulated in the model. Simulated water levels tend to be lower than observed in higher elevations and higher than observed in lower elevations. This relationship could be the result of the channel sediments simulated as one hydraulic conductivity zone. Specifically, the model does not simulate the complex geology and the thinning of the channel along the edges. Again, many of the wells used as targets are production wells, so measured water levels may reflect a pumping water level rather than a static water level. The target on the alluvial fan was not included on this chart as the observed targets were estimated and not based on actual measurements.

C-8.2. Budget

In addition to targets, the overall water budget was evaluated during calibration. The simulated budget, derived from the “reach report” output in Groundwater Vistas, was compared to the conceptual water balance described in Chapter 3. The conductance of the Prado Dam outflow and the hydraulic conductivity of the channel sediments were adjusted to better match the conceptual water balance as well as water levels.

C-9. Sensitivity Analysis

During calibration, the model response to changes of each variable was evaluated seperately to determine its relative sensitivity. As described below, the model results were determined to be sensitive to 1) estimated conductivity and location of the Channel Aquifer, 2) hydraulic conductivity of the Alluvial Fan materials, and 3) the general head boundary at Prado Dam. The location and hydraulic conductivity of the channel sediments (particularly the southern extent of the channel) was found to control local and regional water level elevations. Hydraulic conductivity for the channel sediments were adjusted from 200 feet per day to 100 feet per day. Using a K value of 200 feet/day resulted in water levels that were consistently 10 to 20 feet higher than those simulated with a K value of 125 feet/day. Water levels in the model, specifically at selected targets, were sensitive to the southern extent of the channel sediments. The location of the high K zone was adjusted to better fit the observed data. While the southern extent of the channel differs slightly from the original geologic interpretation, the width and depth of the channel is uncertain. The model-simulated location of the channel is consistent with the overall geologic understanding of its formation.

Water levels in the Alluvial Fan were very sensitive to the hydraulic conductivity of the area. Various K values were simulated in the area ranging from 0.5 feet/day to 50 feet/day. Using high K values resulted in lower water levels at the hypothetical well in the Alluvial Fan area (567 feet msl using 10 feet/day, compared with 837 feet msl using 0.5 feet/day). Higher K in the alluvial fan resulted in slightly lower water levels in the channel area, a decrease of 3 feet when the K value was adjusted from 0.5 feet/day to 10 feet/day.

Because Prado Dam is the primary outflow of groundwater from the basin (aside from pumping), the volume of outflow was sensitive to the conductance of the general head cells representing Prado Dam. A higher boundary conductance increased the outflow and decreased water levels in the channel. The conductance was adjusted during calibration to obtain a good match with water levels and the expected outflow from Prado, on the order of thousands of AFY. Conductance was adjusted over a range of 1,000 feet/day to 200,000 feet/day.

Less sensitive variables included the seasonal variation of water levels at Arlington Gap, hydraulic conductivity of the area north of the channel, inflow from bedrock on the eastern edge of the model, and inflow from Temescal Wash.

C-10. Model Limitations

The limited availability and accuracy of data in the Temescal Subbasin constrains the ability to develop detailed conceptual and numerical models. Overall, the numerical model is a good simulation of the conceptual model, but both the conceptual and numerical model can be improved with additional data and understanding of the basin. Possible improvements include consistent static water level monitoring across the entire subbasin, more information on geology and faulting along the western edge of the model, frequent monitoring at the boundaries

(Arlington Gap, Prado Dam, Chino, Norco), and detailed information on the inflow from the stormwater basins.

The model was designed to simulate the basin on a regional scale and should not be used to examine local issues such as well drawdown or solute transport. The model can be used to compare and relatively quantify management alternatives on a regional scale.

C-11. Management Scenario Application

C-11.1. Baseline

The numerical model calibrated to the 15-year Study Period, 1990-2004 was used as the foundation for a baseline model that simulates future conditions at build out. The 15-year future simulation repeats the hydraulic conditions observed over the Study Period, including the rate of recharge. Land use from 2004 was used to develop recharge zones in the baseline model to better simulate a developed urban area and the amount of return flows and deep percolation from precipitation.

Boundary conditions were also adjusted to simulate expected future conditions. The water levels from Home Gardens Well 3 from 1990 to 2004 were repeated over the 15-year simulation to represent the range of observed conditions at that Arlington Gap boundary. The future water levels at this boundary are uncertain as groundwater management on the Arlington side of the boundary has a large influence on the water levels and therefore flow into the basin. The height of the Prado Reservoir was also repeated over the 15-year period, and the boundary conductance was held constant.

Expected pumping at buildout, 21,726 AFY, was used for each year of the baseline model. (Rounding of model output resulted in numbers of 21,722 AFY to 21, 725 AFY being displayed in report tables). The increase in pumping over 2004 amounts was distributed among wells based on the 2004 pumping distribution (with small changes to prevent simulated dry cells in the model). Pumping from Wells 25 and 9 were decreased slightly and pumping in Well 17 was increased slightly. Estimated wastewater recharge at buildout is expected to be about 16,350 AFY, based on population projections in the City's General Plan (2003) and the Water Master Plan (AKM, April 2005). Current irrigation demand for recycled water is approximately 5,600 AFY. In addition, an outflow to Prado Dam of approximately 2,240 AFY (adjusted for water quality) is required. Subtracting these two demands from total wastewater leaves a total of about 8,510 AFY, an amount repeated over the baseline model to represent levels of recharge at the percolation ponds. (Again, rounding of model output numbers resulted in the small variation of numbers included in report tables). Other recharge components such as bedrock inflow and Temescal Wash inflow remained constant.

The baseline model was used to simulate management scenarios. Changes made to the model for each scenario are discussed below.

C-11.2. Scenario 1: Pumping Redistribution

This scenario redistributed pumping in the aquifer. Two new wells were added in the northwestern part of the channel, near Prado Management Area. These wells were simulated as pumping 2,500 AFY each and the remaining 16,742 AFY of buildout pumping was distributed among the existing wells based on the same proportion as used in the baseline model. Aside from the well package, no other changes were made to the baseline numerical model for Scenario 1.

C-11.3. Scenario 2: Additional Recharge at Oak Detention Basin

This scenario examined additional recharge in the Oak Avenue Detention Basin and a slight reduction in wastewater recharge. The Oak Avenue Detention Basin recharge (simulated in the recharge package) was increased to 5,000 AFY. Wastewater flows, also simulated in the recharge package, were decreased to 8,250 AFY to reflect the use of recycled water for one-half of the enhanced recharge water. The distribution of monthly wastewater recharge was maintained. No changes were made to the well package (including bedrock inflows or pumping).

C-11.4. Scenario 3: Additional Recharge at Main Street Detention Basin

This scenario, similar to scenario 2, examined additional recharge in the Main Street Detention Basin and an increase in wastewater recharge. The Main Street Detention Basin recharge was increased to 1,500 AFY. Since recharge with recycled water was not as high in this scenario, wastewater flows were increased from Scenario 2. In addition, it was assumed that the outflow to Prado Management Area could be maintained through subsurface outflow and wastewater recharge was increased to the current permit amount of 9,520 AFY recharge at the percolation ponds, using the same monthly distribution (rounding results in an average of 9,507 AFY). No changes were made to the well package (including bedrock inflows or pumping).

C-11.5. Scenario 4a: Recharge wells near Arlington Gap (4 wells)

This scenario examined the addition of recharge wells near Arlington Gap. It was determined that approximately 5 mgd of recycled water could be dedicated to recharge wells during the non-irrigation season. Four wells, recharging a total of 2,762 AFY (5 mgd over six months of recharge), were simulated near the eastern boundary of the model. Wastewater recharge at the percolation ponds were increased from baseline to 9,369 AFY, while maintaining the same monthly distribution. Extraction pumping remained the same as baseline.

C-11.6. Scenario 4b: Recharge wells near Arlington Gap (7 wells)

This scenario is similar to scenario 4a; however a total of seven recharge wells were used to recharge near the Arlington Gap. The amount of recharge was 5,524 AFY (10 mgd over six months). In this scenario wastewater recharge at the ponds were decreased to an average of 7,988 AFY, assuming that a portion of that water would be dedicated to recharge. Extraction pumping remained the same as baseline.

C-11.7. Results

Chapter 6 includes discussion of these management scenarios that were simulated using the numerical model. The water levels and budgets of each scenario were compared to the baseline model and the effectiveness of each management scenario is discussed. Tables with water budgets on an average basis for each management scenario are provided in Chapter 6. The complete water budgets for the baseline model and the five scenarios are provided here in Tables C-3 through C-8. Water levels for the baseline evaluation and the five scenarios at the eight targets are shown in Figures C-11 through C-14.

Table C-3
Baseline Simulation

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	482	478	478	478	482	478	478	478	482	478	478	478	482	478	478	**479**
Recharge from Wastewater Discharge	8,511	8,502	8,502	8,502	8,511	8,502	8,502	8,502	8,511	8,502	8,502	8,502	8,511	8,502	8,502	**8,504**
Subsurface Inflow Subtotal	6,601	6,356	5,191	4,212	4,603	5,407	5,948	5,417	5,492	5,662	5,219	4,635	3,756	4,302	4,648	**5,163**
- Arlington Gap	5,618	5,375	4,211	3,232	3,620	4,427	4,968	4,437	4,509	4,681	4,239	3,655	2,773	3,322	3,668	4,182
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	817	815	815	815	817	815	815	815	817	815	815	815	817	815	815	816
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
TOTAL INFLOWS (AFY)	**17,997**	**18,096**	**17,316**	**29,889**	**15,636**	**18,491**	**15,862**	**16,786**	**20,744**	**17,417**	**16,973**	**17,835**	**18,659**	**16,659**	**17,297**	**18,377**
OUTFLOWS																
Groundwater Pumping	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,722	**21,722**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,382	5,337	5,313	5,284	5,255	5,231	5,231	5,215	5,195	**5,481**
TOTAL OUTFLOWS (AFY)	**28,196**	**27,733**	**27,454**	**27,325**	**27,236**	**27,157**	**27,104**	**27,059**	**27,037**	**27,005**	**26,976**	**26,953**	**26,956**	**26,936**	**26,917**	**27,203**
CHANGE IN STORAGE (AF)																**-8,826**

Table C-4
Scenario 1: Pumping Redistribution

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	482	478	478	478	482	478	478	478	482	478	478	478	482	478	478	**479**
Recharge from Wastewater Discharge	8,511	8,502	8,502	8,502	8,511	8,502	8,502	8,502	8,511	8,502	8,502	8,502	8,511	8,502	8,502	**8,504**
Subsurface Inflow Subtotal	6,586	6,276	5,051	4,018	4,379	5,159	5,676	5,128	5,182	5,341	4,890	4,292	3,407	3,950	4,287	**4,908**
- Arlington Gap	5,576	5,269	4,044	3,012	3,369	4,152	4,670	4,121	4,172	4,334	3,884	3,286	2,397	2,943	3,281	3,901
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	844	841	841	841	844	841	841	841	844	841	841	841	844	841	841	842
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
TOTAL INFLOWS (AFY)	**17,982**	**18,016**	**17,175**	**29,695**	**15,411**	**18,242**	**15,590**	**16,497**	**20,434**	**17,096**	**16,643**	**17,493**	**18,310**	**16,307**	**16,937**	**18,122**
OUTFLOWS																
Groundwater Pumping	21,749	21,740	21,740	21,740	21,749	21,740	21,740	21,740	21,749	21,740	21,740	21,740	21,749	21,740	21,740	**21,742**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,381	5,336	5,310	5,282	5,249	5,225	5,222	5,196	5,158	**5,475**
TOTAL OUTFLOWS (AFY)	**28,221**	**27,751**	**27,472**	**27,343**	**27,261**	**27,175**	**27,120**	**27,076**	**27,059**	**27,021**	**26,989**	**26,965**	**26,971**	**26,935**	**26,898**	**27,217**
CHANGE IN STORAGE (AF)																**-9,095**

Table C-5
Scenario 2: Enhanced Recharge at Oak Avenue Basin

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	5,265	5,240	5,240	5,240	5,265	5,240	5,240	5,240	5,265	5,240	5,240	5,240	5,265	5,240	5,240	**5,246**
- Oak Street	5,023	5,000	5,000	5,000	5,023	5,000	5,000	5,000	5,023	5,000	5,000	5,000	5,023	5,000	5,000	5,006
- Main Street	241	240	240	240	241	240	240	240	241	240	240	240	241	240	240	240
Recharge from Wastewater Discharge	8,252	7,768	8,244	8,244	8,252	8,244	8,244	8,244	8,252	8,244	8,244	8,244	8,252	8,244	8,244	**8,214**
Subsurface Inflow Subtotal	6,627	6,385	5,223	4,246	4,639	5,444	5,983	5,454	5,531	5,702	5,257	4,674	3,794	4,340	4,687	**5,199**
- Arlington Gap	5,618	5,378	4,216	3,239	3,629	4,437	4,976	4,448	4,521	4,696	4,251	3,668	2,784	3,334	3,680	4,192
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	844	841	841	841	844	841	841	841	844	841	841	841	844	841	841	842
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
TOTAL INFLOWS (AFY)	**22,548**	**22,153**	**21,850**	**34,425**	**20,196**	**23,030**	**20,399**	**21,327**	**25,307**	**21,960**	**21,513**	**22,378**	**23,222**	**21,200**	**21,839**	**22,890**
OUTFLOWS																
Groundwater Pumping	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,658	**21,718**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,382	5,337	5,313	5,284	5,255	5,231	5,231	5,215	5,195	**5,481**
TOTAL OUTFLOWS (AFY)	**28,196**	**27,733**	**27,454**	**27,325**	**27,236**	**27,157**	**27,104**	**27,059**	**27,037**	**27,005**	**26,976**	**26,953**	**26,956**	**26,936**	**26,853**	**27,199**
CHANGE IN STORAGE (AF)																**-4,309**

Table C-6
Scenario 3: Enhanced Recharge at Main St Basin

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	1,749	1,740	1,740	1,740	1,749	1,740	1,740	1,740	1,749	1,740	1,740	1,740	1,749	1,740	1,740	**1,743**
- Oak Street	241	240	240	240	241	240	240	240	241	240	240	240	241	240	240	240
- Main Street	1,507	1,500	1,500	1,500	1,507	1,500	1,500	1,500	1,507	1,500	1,500	1,500	1,507	1,500	1,500	1,502
Recharge from Wastewater Discharge	9,515	9,505	9,505	9,505	9,515	9,505	9,505	9,505	9,515	9,505	9,505	9,505	9,515	9,505	9,505	**9,507**
Subsurface Inflow Subtotal	6,627	6,379	5,208	4,222	4,607	5,407	5,939	5,410	5,481	5,651	5,210	4,619	3,740	4,284	4,629	**5,161**
- Arlington Gap	5,618	5,373	4,201	3,216	3,597	4,401	4,932	4,404	4,471	4,645	4,204	3,613	2,731	3,278	3,622	4,154
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	844	841	841	841	844	841	841	841	844	841	841	841	844	841	841	842
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
TOTAL INFLOWS (AFY)	**20,295**	**20,384**	**19,597**	**32,164**	**17,910**	**20,756**	**18,117**	**19,044**	**23,004**	**19,671**	**19,228**	**20,085**	**20,915**	**18,906**	**19,543**	**20,642**
OUTFLOWS																
Groundwater Pumping	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,722	21,722	21,725	21,722	21,722	**21,722**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,382	5,337	5,313	5,292	5,255	5,231	5,232	5,215	5,196	**5,481**
TOTAL OUTFLOWS (AFY)	**28,196**	**27,733**	**27,454**	**27,325**	**27,236**	**27,157**	**27,104**	**27,059**	**27,037**	**27,013**	**26,976**	**26,953**	**26,957**	**26,937**	**26,917**	**27,204**
CHANGE IN STORAGE (AF)																**-6,562**

Table C-7
Scenario 4a: Arlington Gap Recharge (4 Wells)

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	482	478	478	478	482	478	478	478	482	478	478	478	482	478	478	**479**
Recharge from Wastewater Discharge	9,397	9,388	9,388	9,388	9,397	9,388	9,388	9,388	9,397	9,388	9,388	9,388	9,397	9,388	9,388	**9,390**
Subsurface Inflow Subtotal	6,136	5,547	4,252	3,190	3,561	4,338	4,853	4,302	4,352	4,519	4,074	3,486	2,608	3,157	3,497	**4,125**
- Arlington Gap	5,140	4,554	3,259	2,197	2,564	3,345	3,860	3,309	3,355	3,526	3,081	2,492	1,611	2,163	2,504	3,131
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	835	832	832	832	835	832	832	832	835	832	832	832	835	832	832	833
- Norco	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
Recharge Wells at Arlington	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	2,762	**2,762**
TOTAL INFLOWS (AFY)	**21,181**	**20,935**	**20,024**	**32,515**	**18,241**	**21,069**	**18,415**	**19,319**	**23,252**	**19,922**	**19,475**	**20,334**	**21,160**	**19,162**	**19,795**	**20,987**
OUTFLOWS																
Groundwater Pumping	21,705	21,722	21,722	21,722	21,705	21,722	21,722	21,722	21,705	21,722	21,722	21,722	21,705	21,722	21,722	**21,717**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,382	5,337	5,313	5,292	5,255	5,231	5,232	5,215	5,196	**5,481**
TOTAL OUTFLOWS (AFY)	**28,177**	**27,733**	**27,454**	**27,325**	**27,217**	**27,157**	**27,104**	**27,059**	**27,018**	**27,013**	**26,977**	**26,953**	**26,937**	**26,937**	**26,917**	**27,199**
CHANGE IN STORAGE (AF)																**-6,212**

Table C-8
Scenario 4b: Recharge Wells at Arlington Gap (7 Wells)

Water Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Ave.
INFLOWS																
Deep Percolation from Precipitation	0	0	384	13,937	0	1,343	0	0	3,500	15	13	1,460	3,151	617	909	**1,689**
Infiltration of Runoff in Detention Basins	482	478	478	478	482	478	478	478	482	478	478	478	482	478	478	**479**
Recharge from Wastewater Discharge	7,994	7,986	7,986	7,986	7,994	7,986	7,986	7,986	7,994	7,986	7,986	7,986	7,994	7,986	7,986	**7,988**
Subsurface Inflow Subtotal	5,381	4,407	3,010	1,904	2,253	3,016	3,521	2,960	2,990	3,167	2,721	2,132	1,264	1,816	2,148	**2,846**
- Arlington Gap	4,371	3,400	2,004	897	1,244	2,009	2,514	1,954	1,981	2,160	1,714	1,126	254	809	1,142	1,839
- Temescal Wash (Temescal Canyon)	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113	113
- Bedrock in Watershed	844	841	841	841	844	841	841	841	844	841	841	841	844	841	841	842
- Norco	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Return Flows Subtotal	2,404	2,760	2,760	2,760	2,040	2,760	933	2,389	2,760	2,760	2,760	2,760	2,760	2,760	2,760	**2,542**
Recharge Wells	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	5,524	**5,524**
TOTAL INFLOWS (AFY)	**21,785**	**21,155**	**20,143**	**32,589**	**18,293**	**21,107**	**18,443**	**19,338**	**23,250**	**19,930**	**19,482**	**20,341**	**21,175**	**19,181**	**19,806**	**21,068**
OUTFLOWS																
Groundwater Pumping	21,690	21,723	21,723	21,723	21,690	21,723	21,723	21,723	21,690	21,723	21,723	21,723	21,690	21,723	21,723	**21,715**
Subsurface Outflow to Santa Ana River	6,472	6,011	5,732	5,604	5,512	5,436	5,382	5,337	5,313	5,284	5,255	5,231	5,231	5,215	5,195	**5,481**
TOTAL OUTFLOWS (AFY)	**28,162**	**27,735**	**27,456**	**27,327**	**27,202**	**27,159**	**27,106**	**27,061**	**27,003**	**27,007**	**26,978**	**26,955**	**26,922**	**26,938**	**26,919**	**27,195**
CHANGE IN STORAGE (AF)																**-6,127**

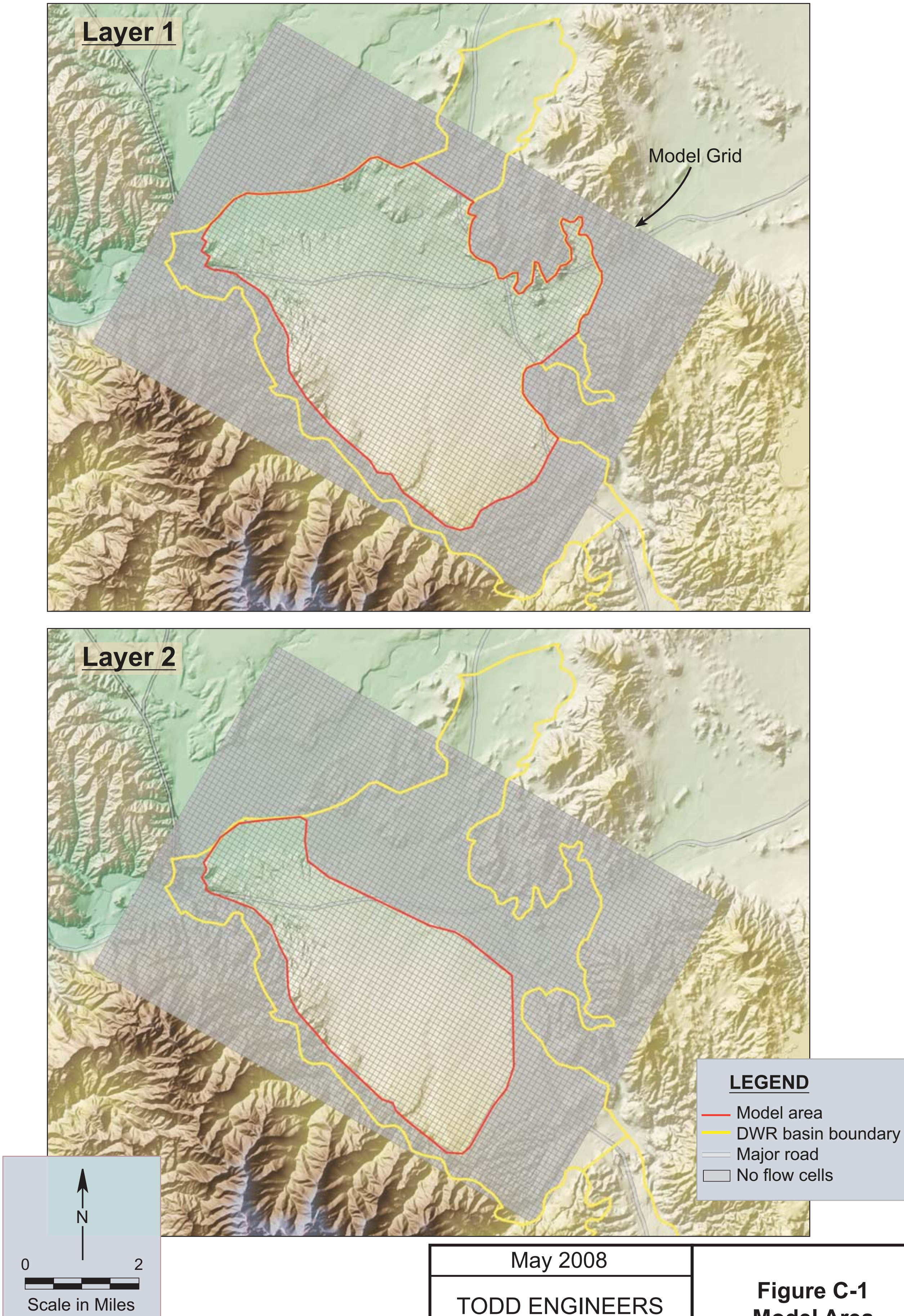


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Figure C-1
Model Area

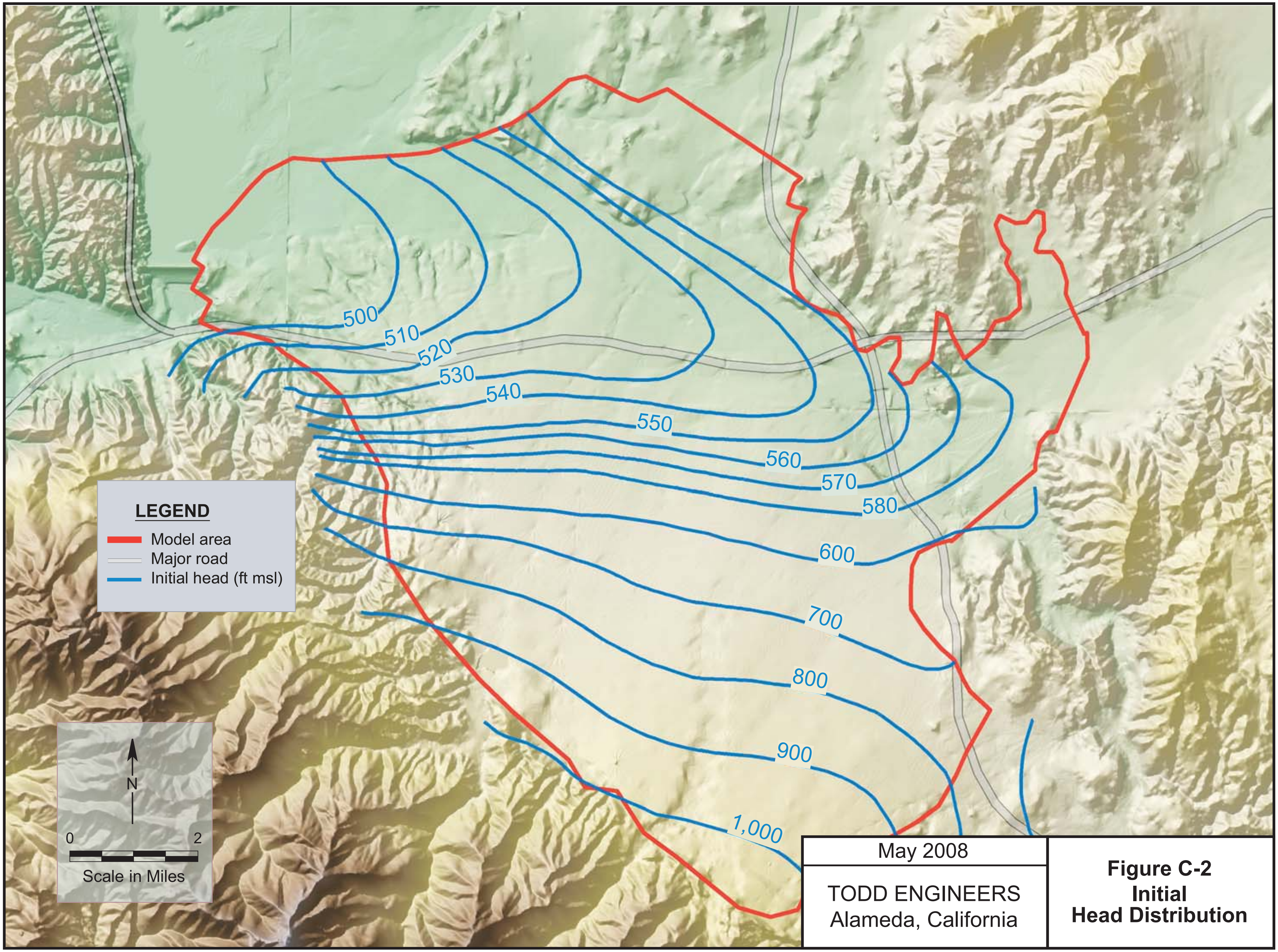

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Figure C-2
Initial
Head Distribution

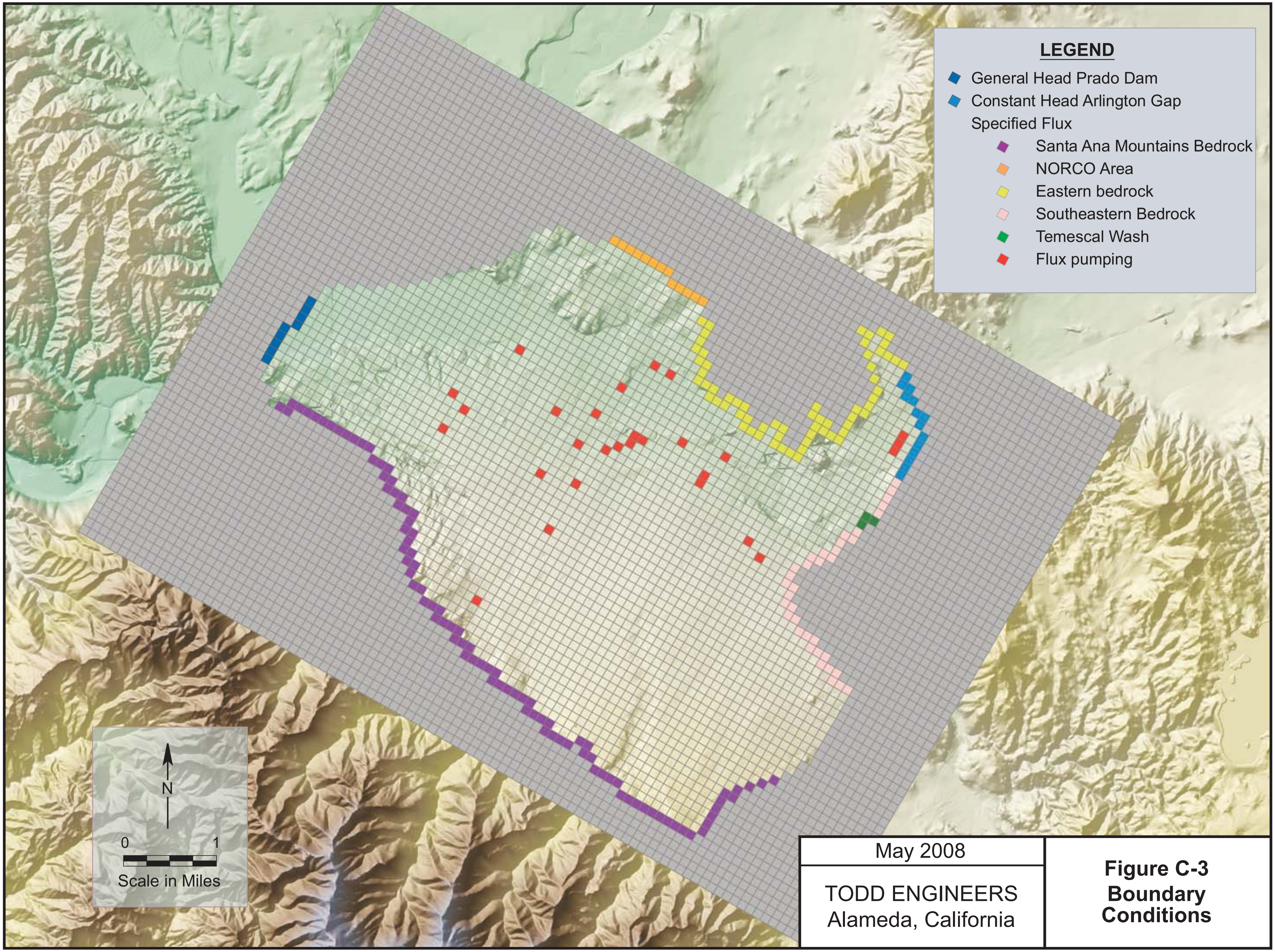

Figure C-3
Boundary Conditions

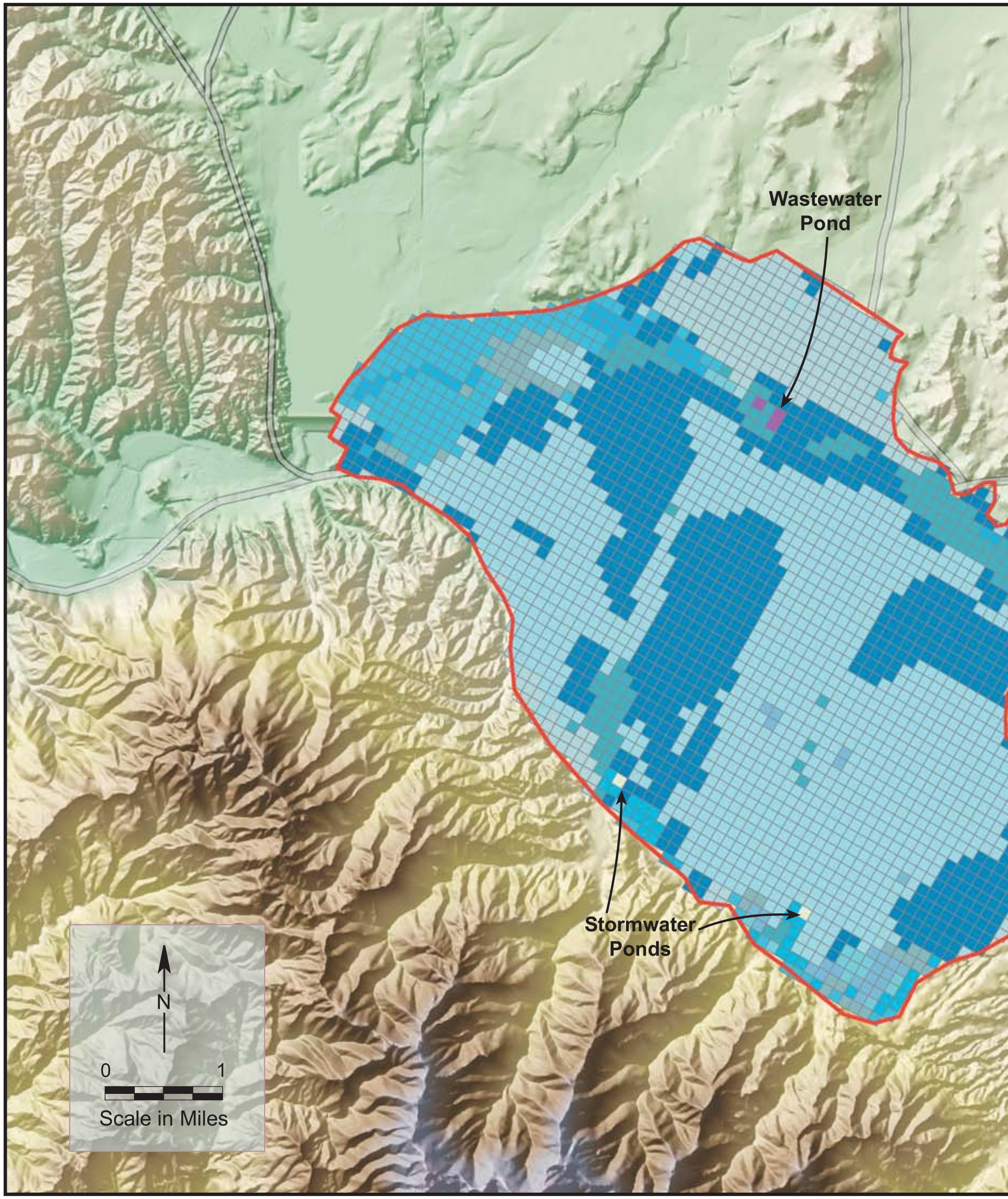

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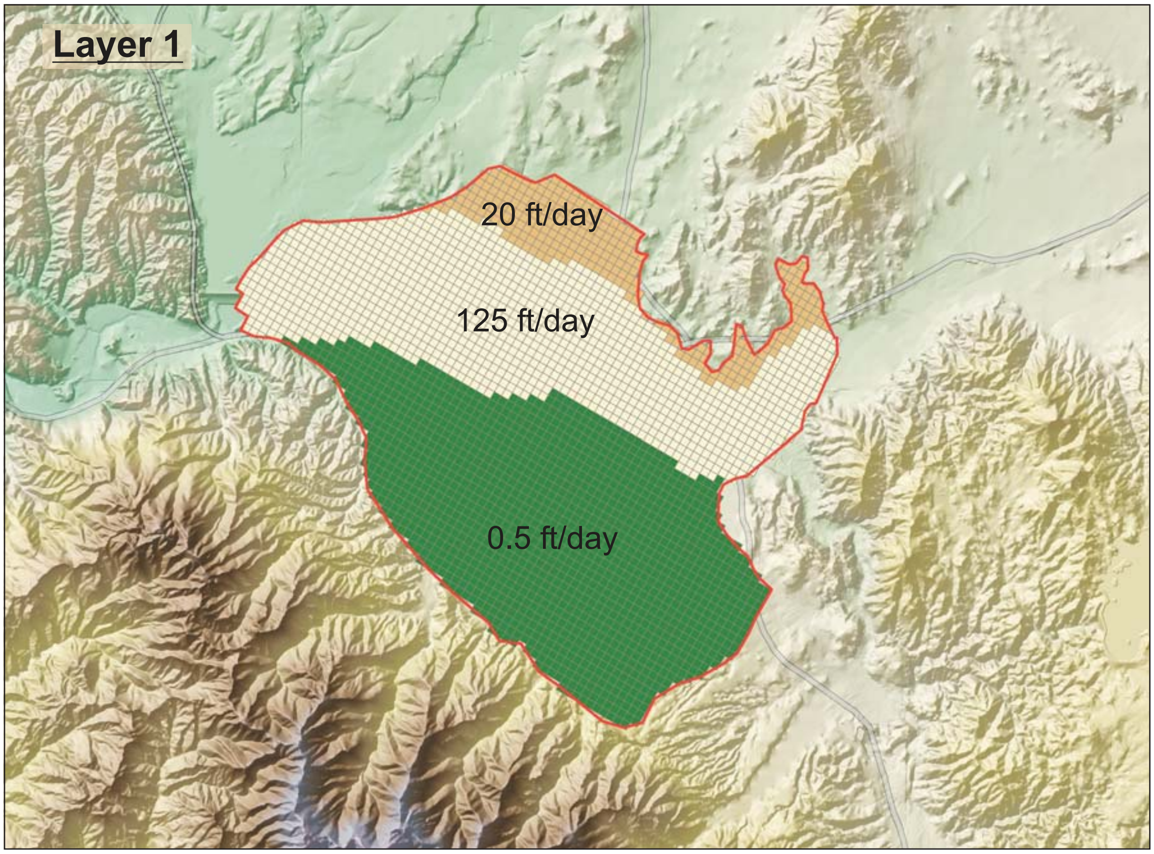
Figure C-4
Recharge Zones
(2004)



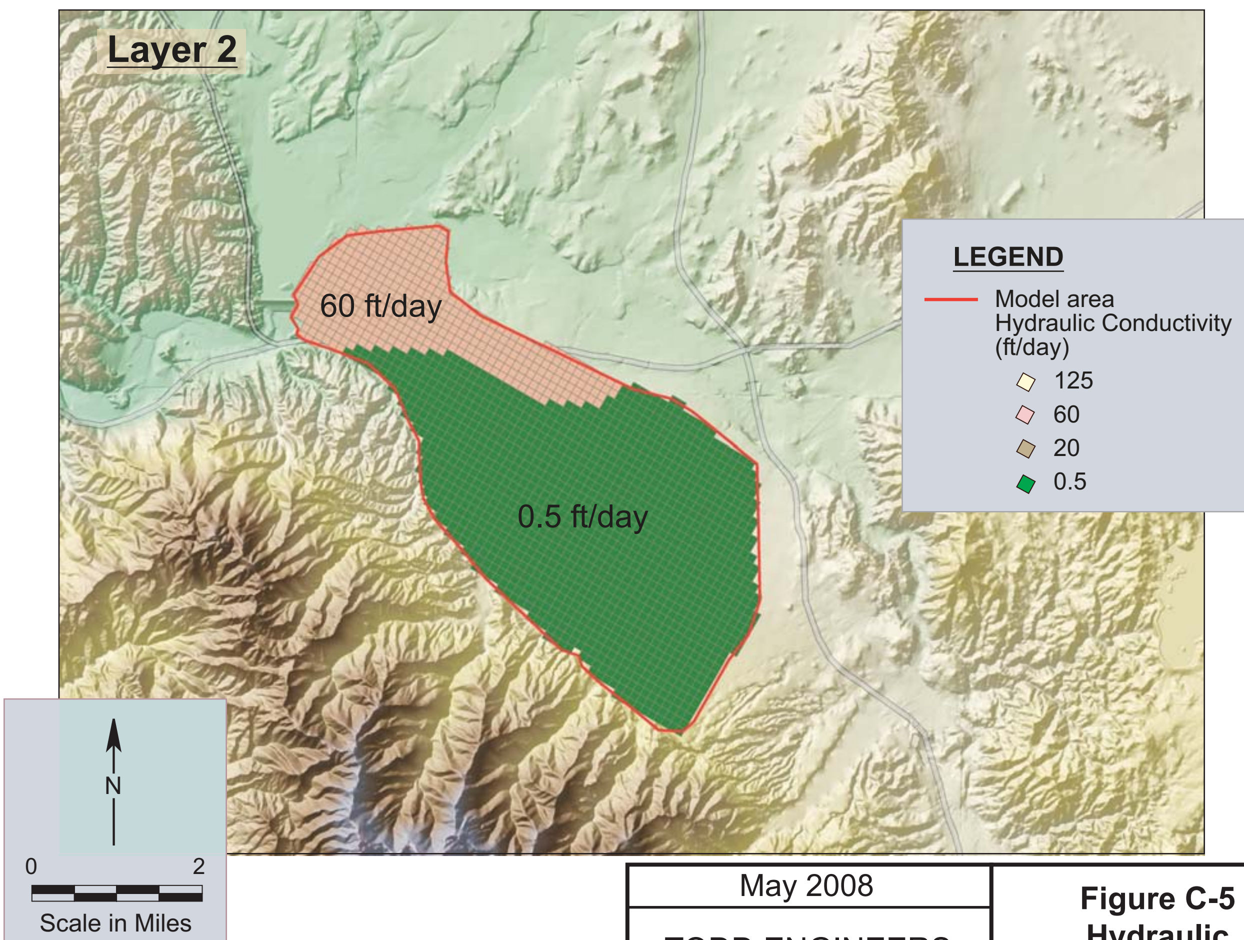


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Figure C-5
Hydraulic Conductivity Distribution

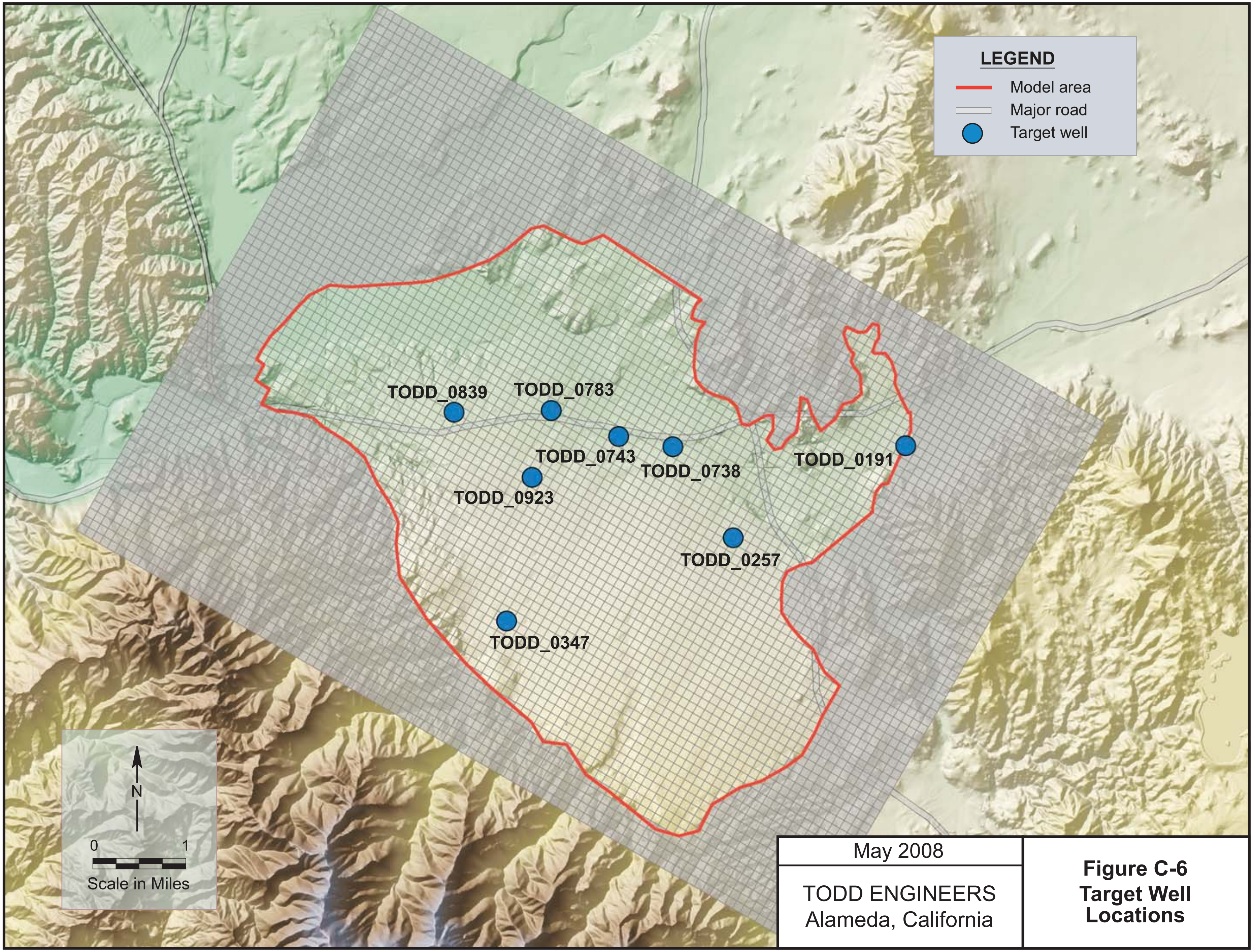

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Figure C-6
Target Well Locations

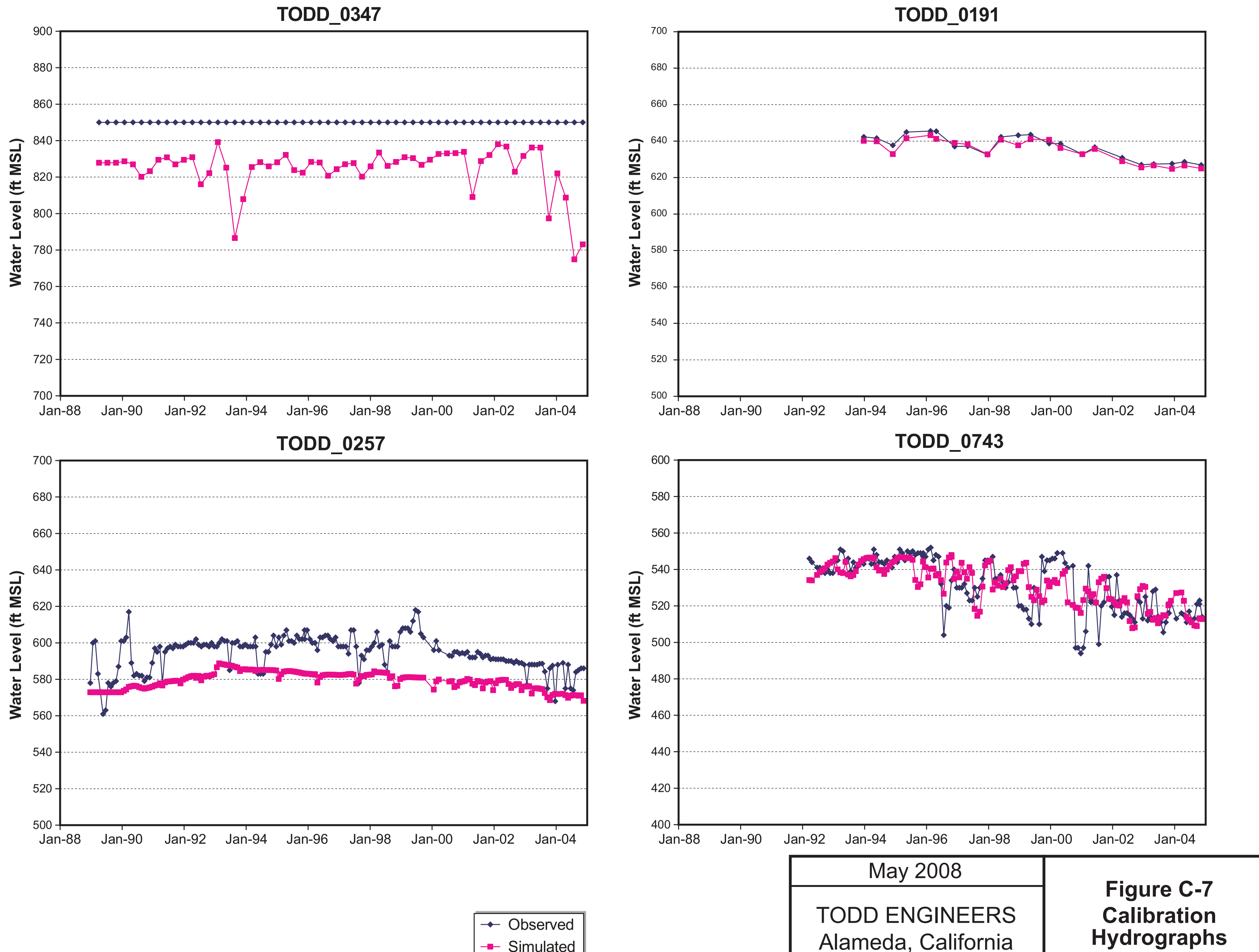

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Figure C-7
Calibration Hydrographs

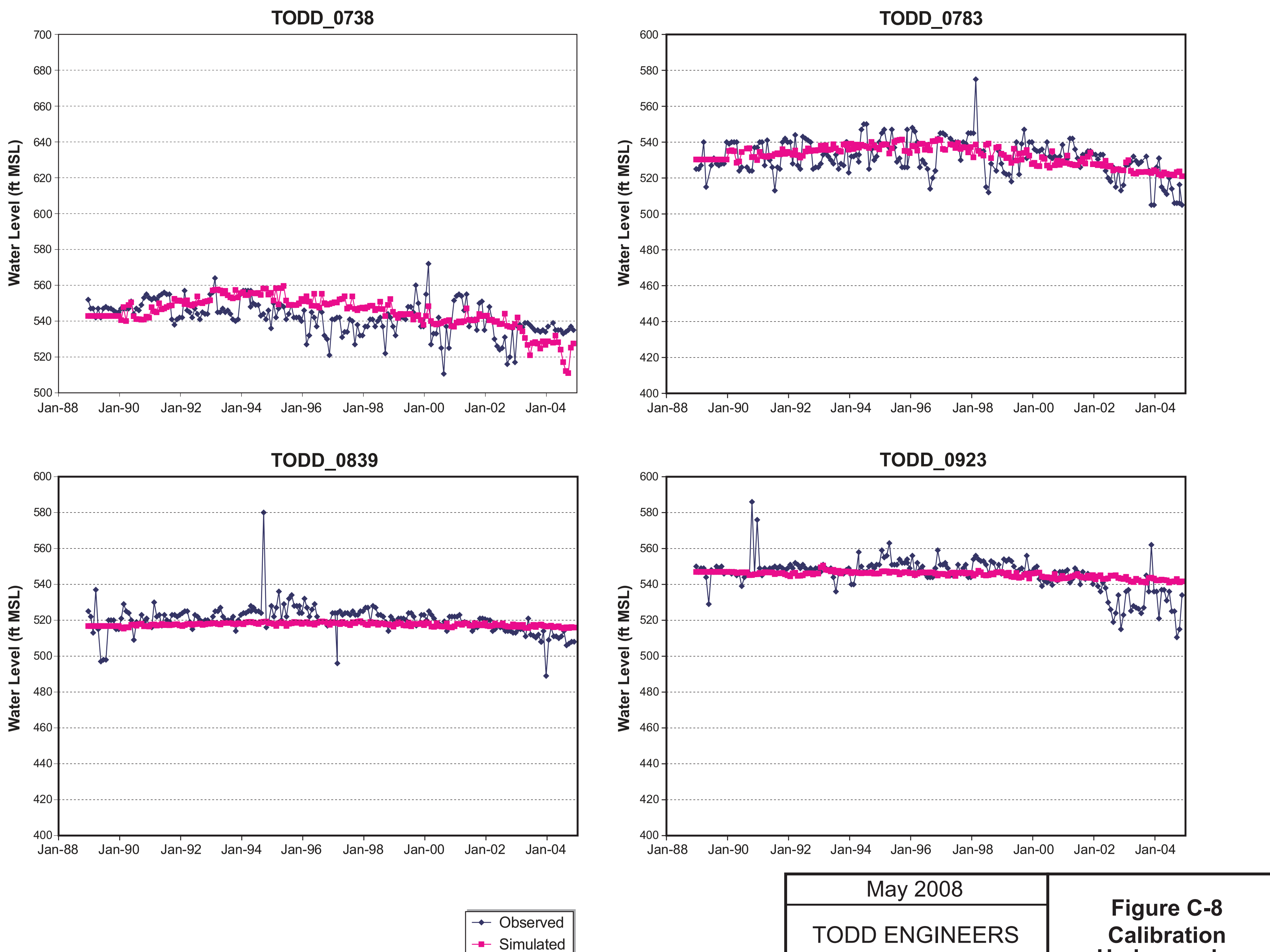

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Figure C-8
Calibration Hydrographs

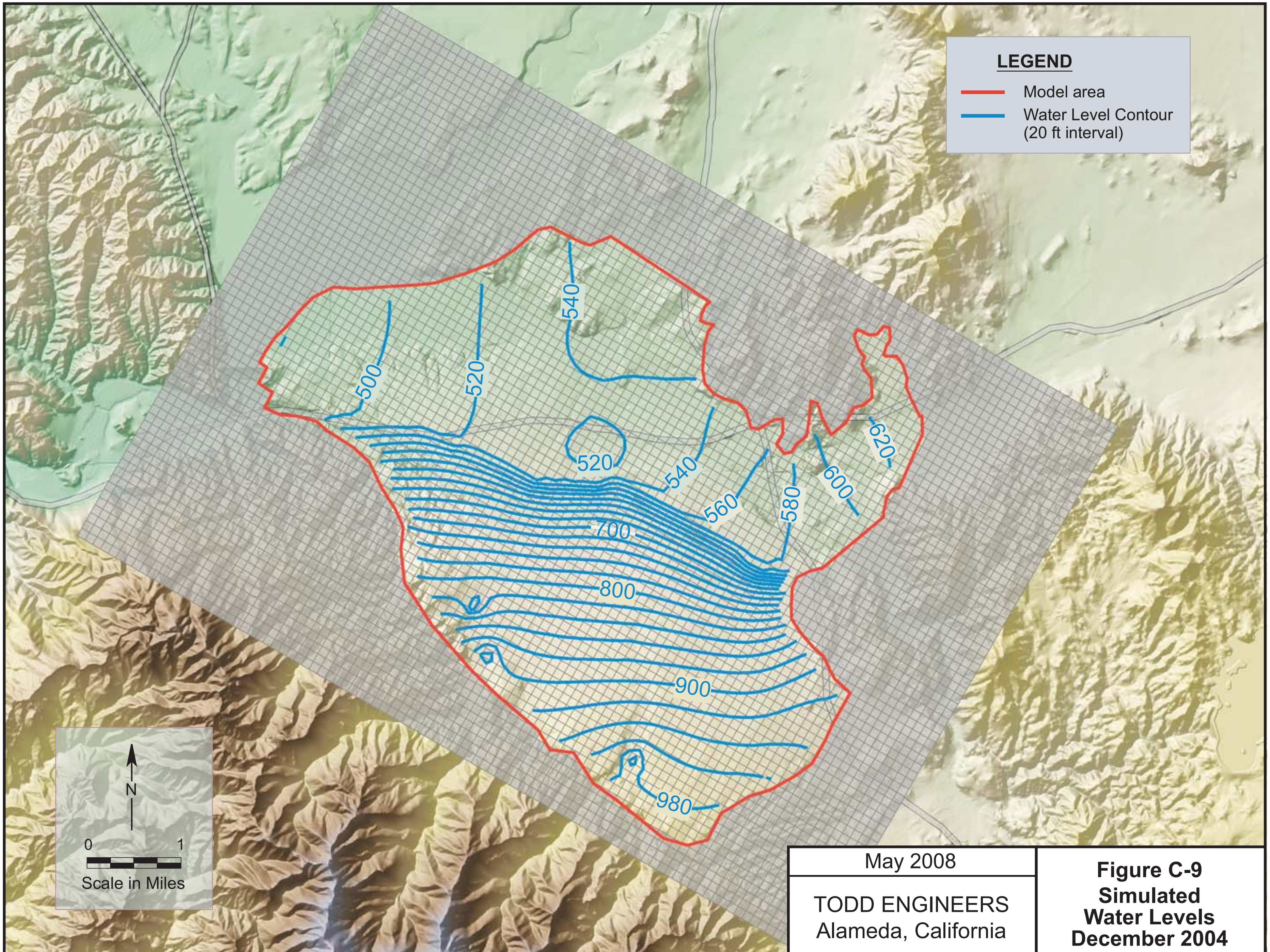

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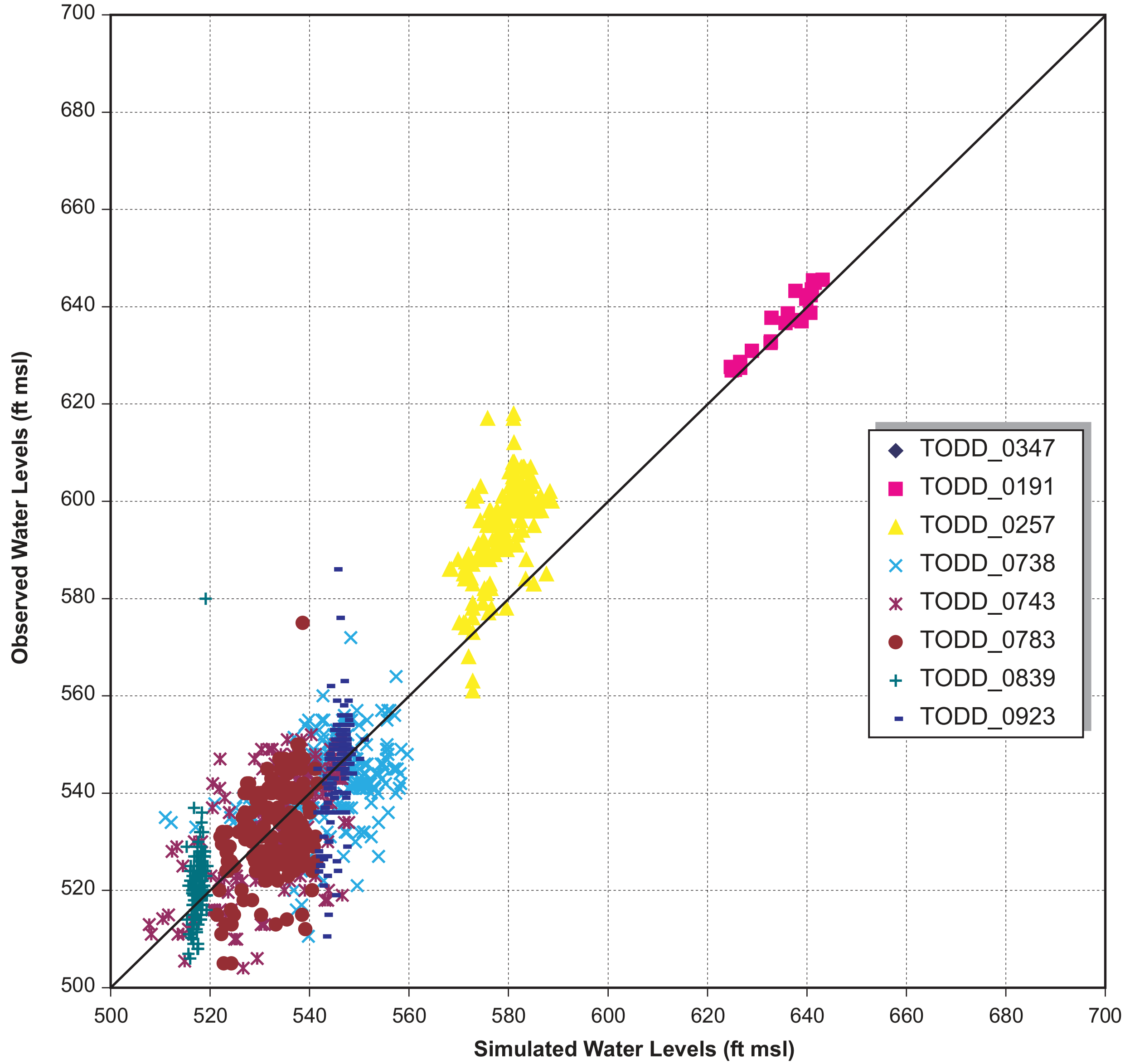
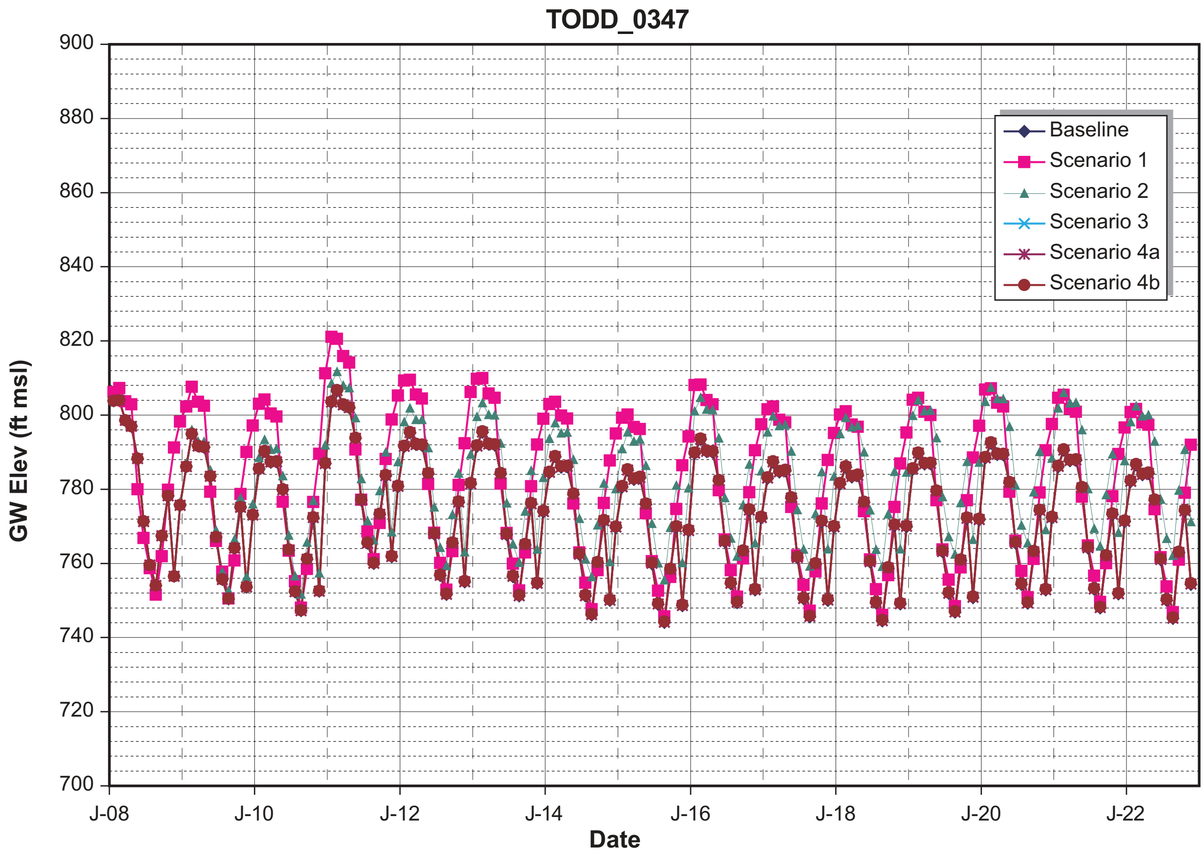
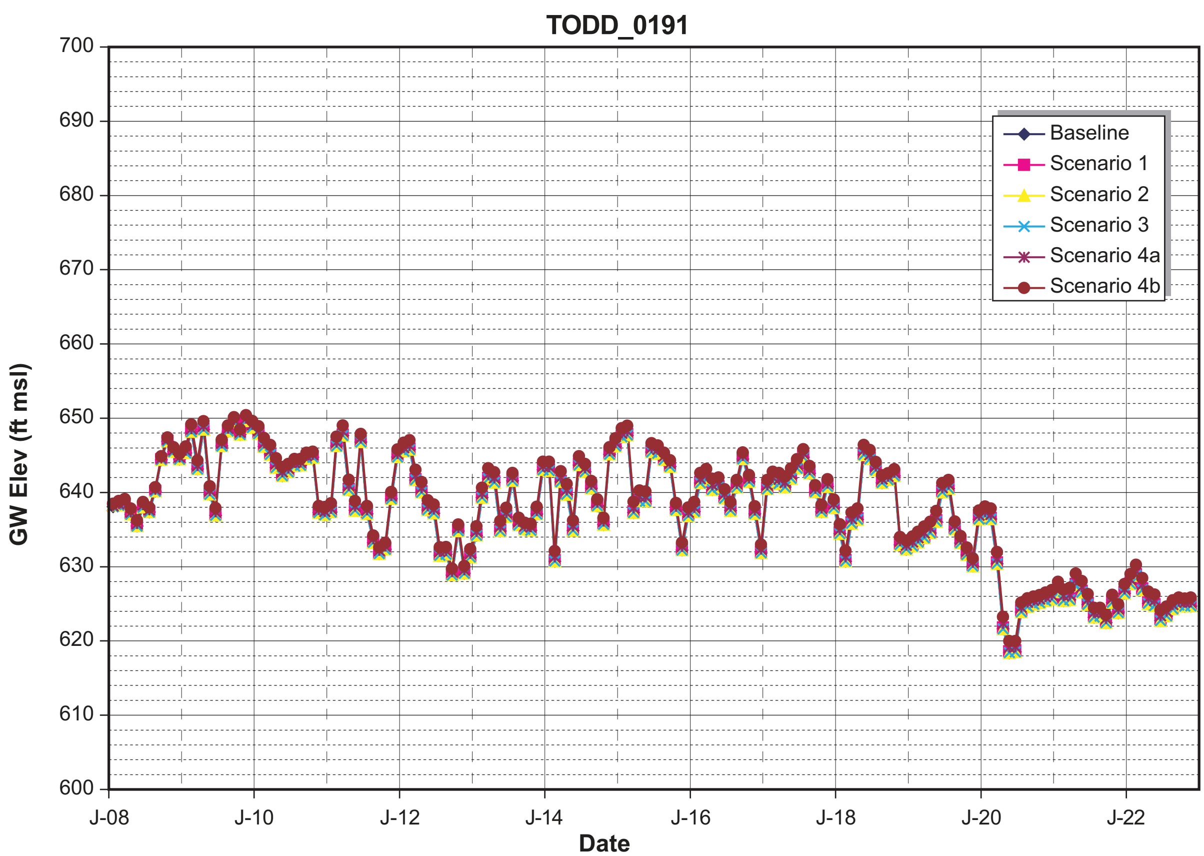
Figure C-9
Simulated Water Levels
December 2004

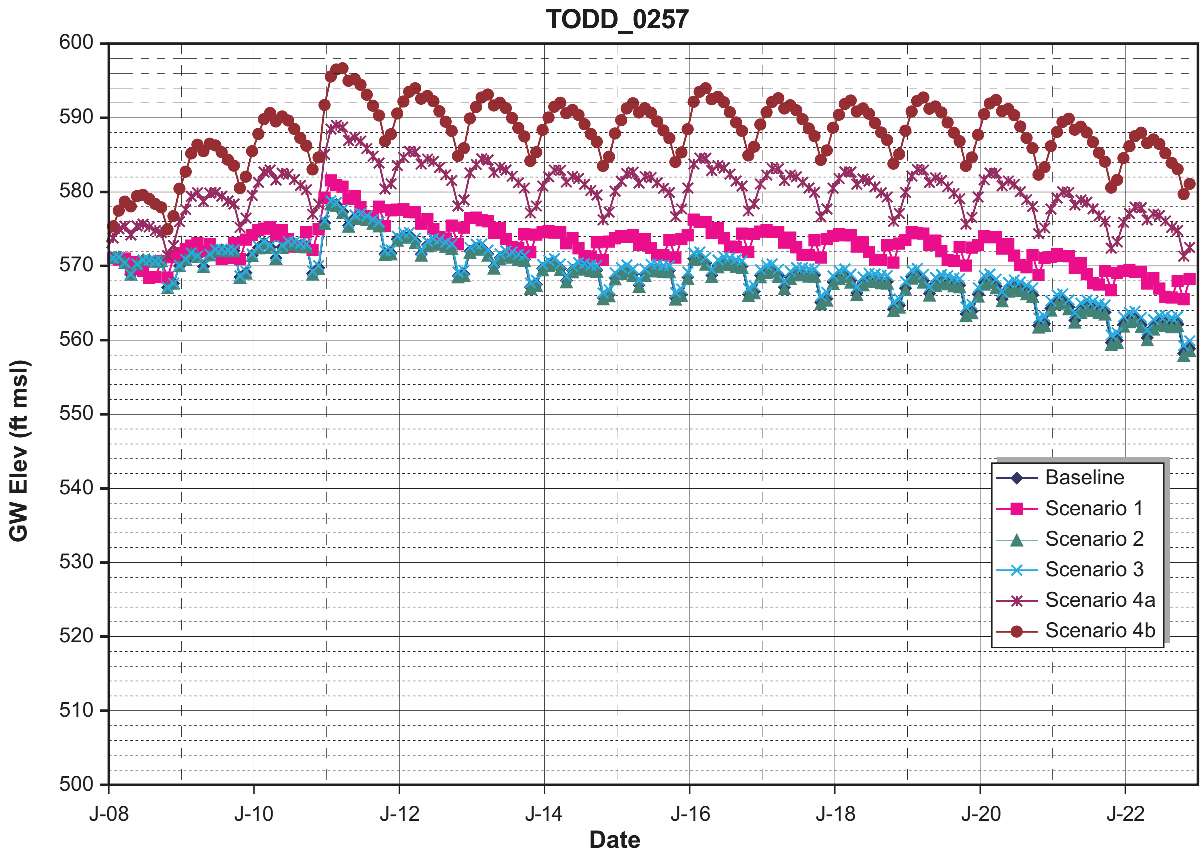


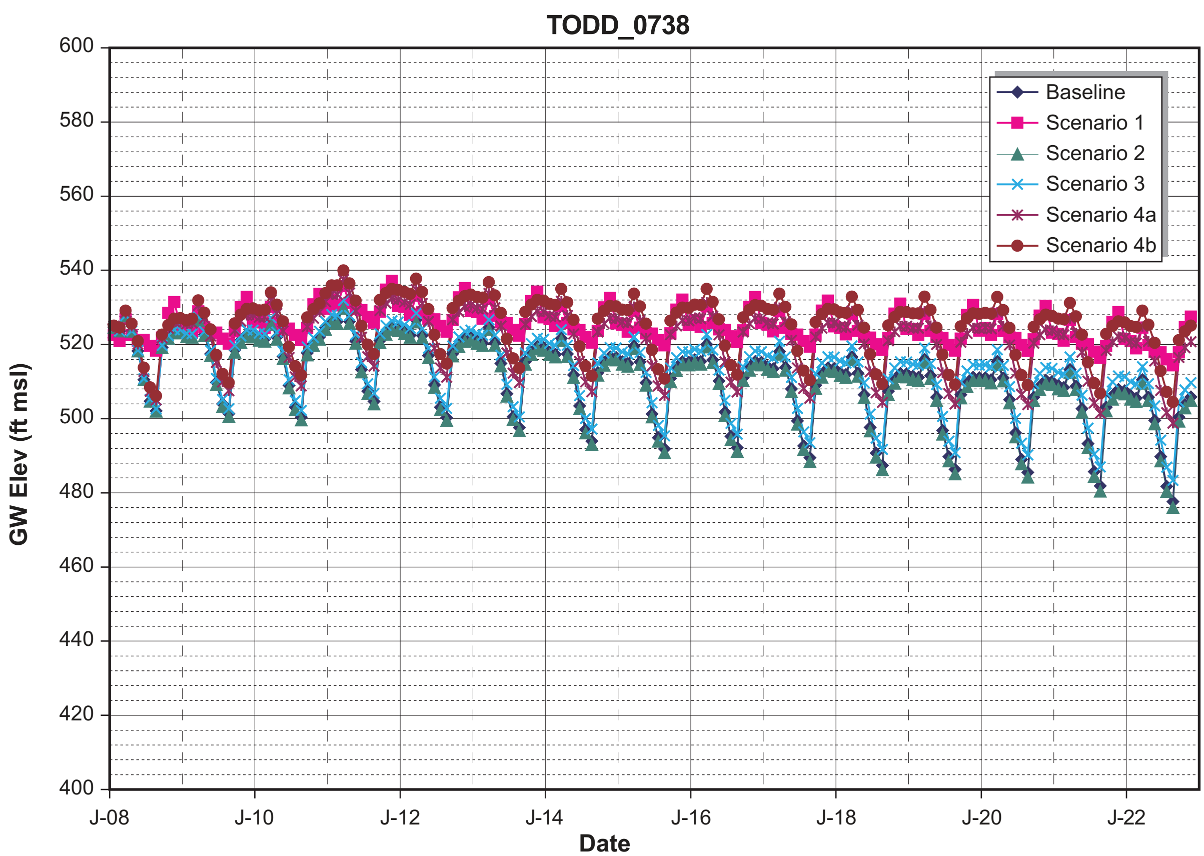
May 2008	**Figure C-10 Observed vs. Simulated Water Levels**
TODD ENGINEERS Alameda, California	



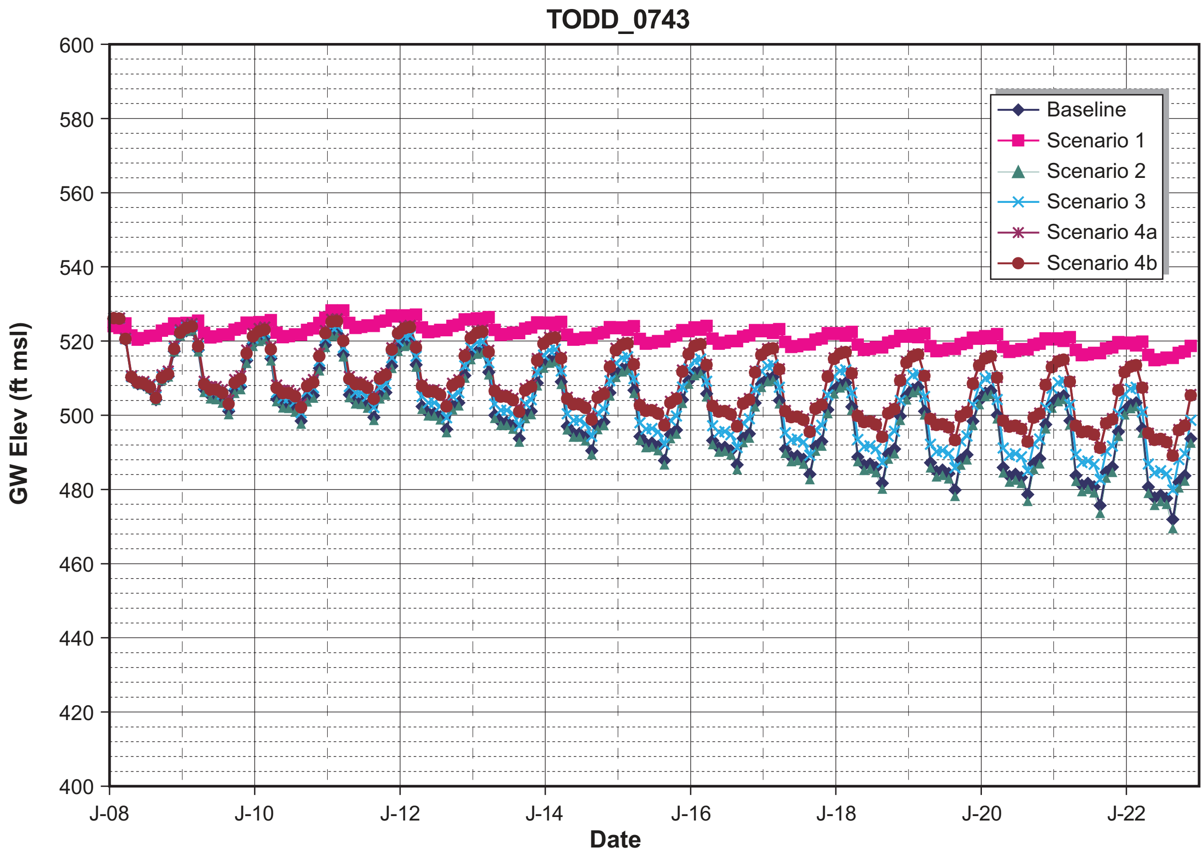


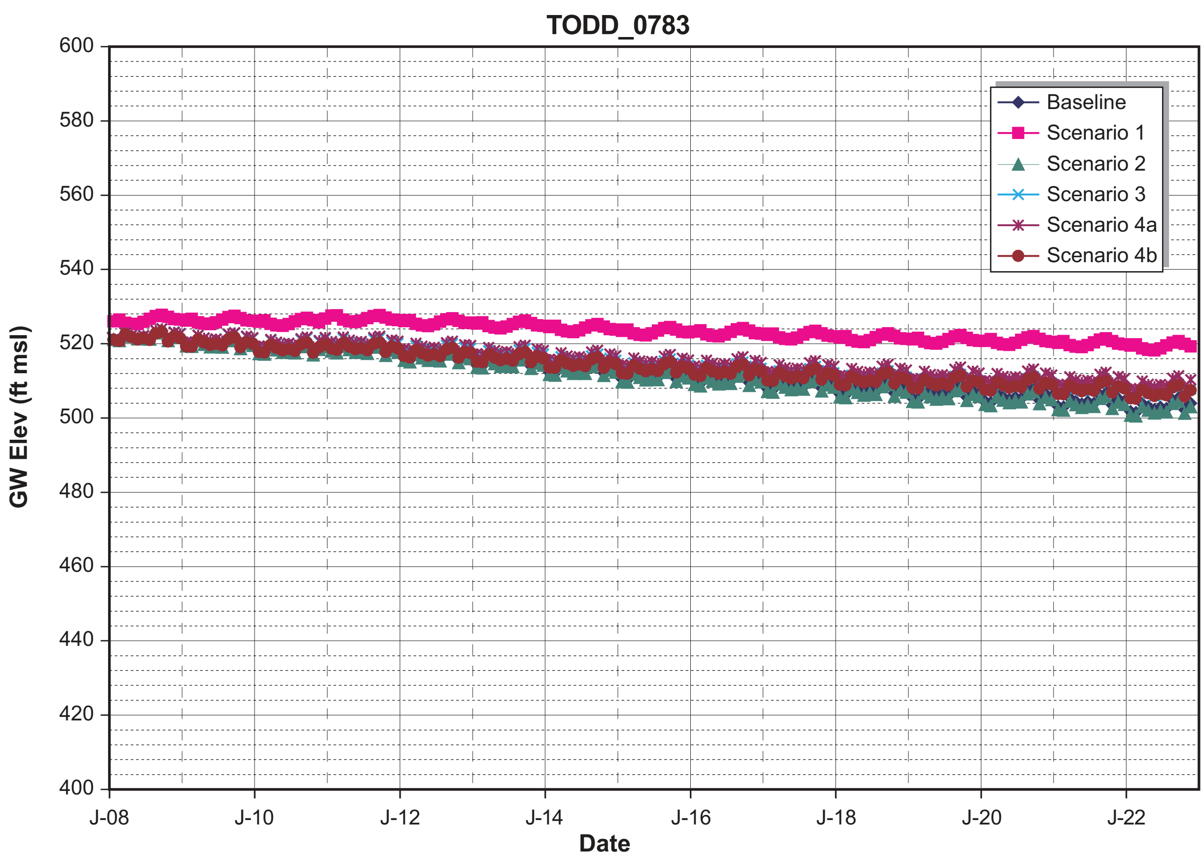
May 2008	**Figure C-11**
TODD ENGINEERS Alameda, California	**Baseline and Scenario - Hydrographs**



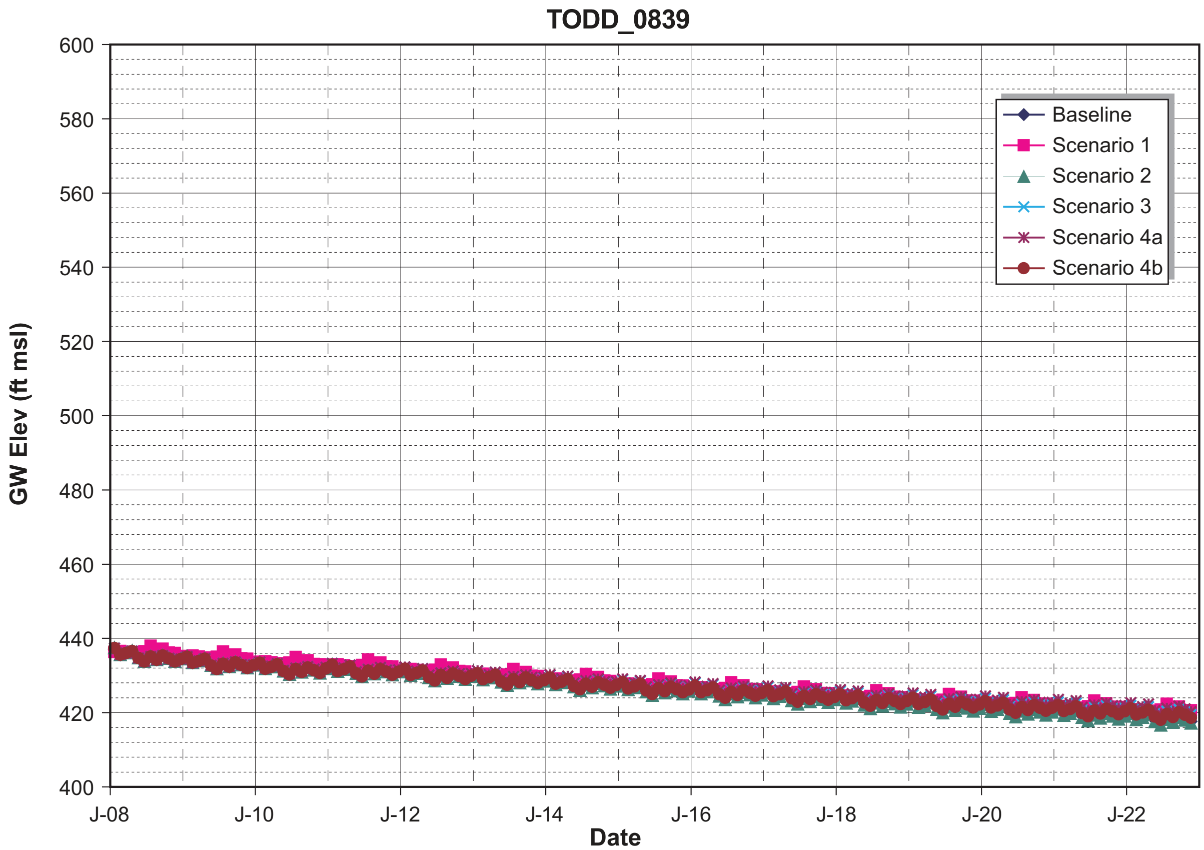


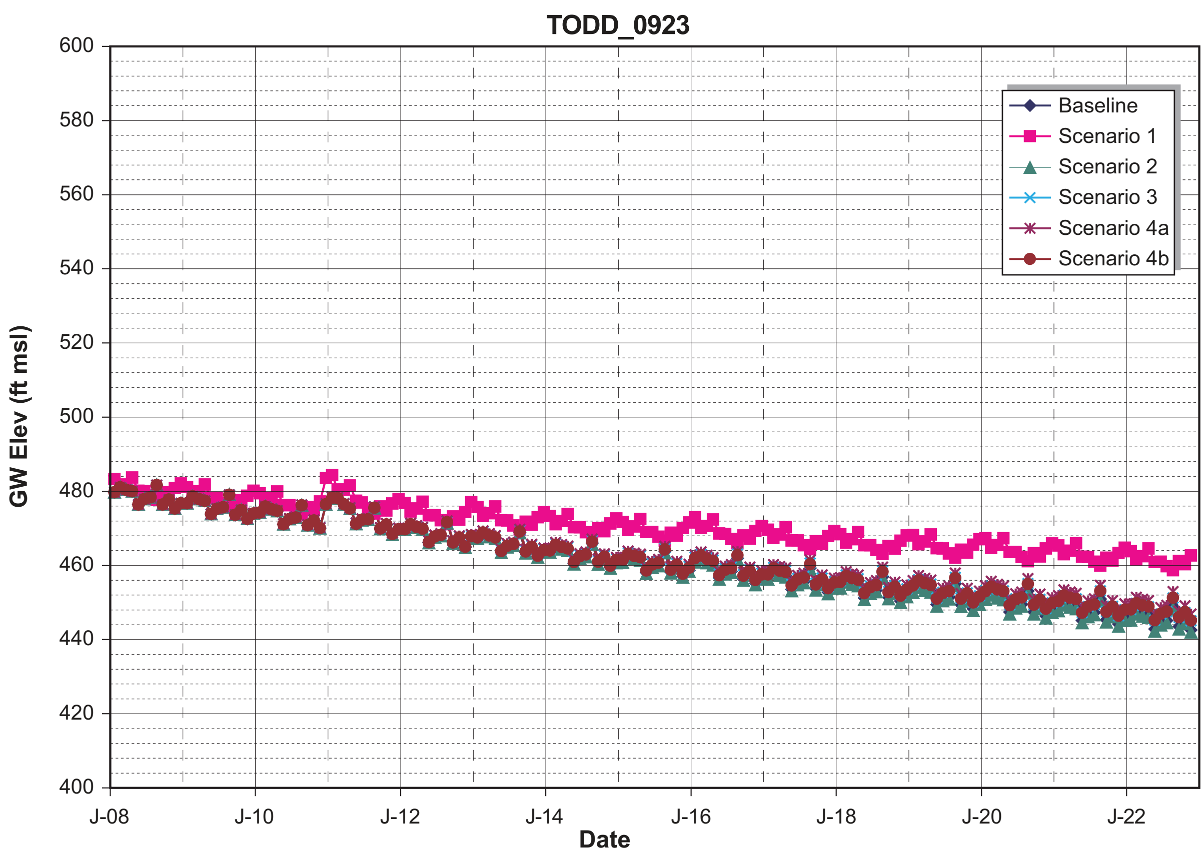
May 2008	**Figure C-12**
TODD ENGINEERS Alameda, California	**Baseline and Scenario - Hydrographs**





May 2008	**Figure C-13 Baseline and Scenario Hydrographs**
TODD ENGINEERS Alameda, California	





May 2008	**Figure C-14**
TODD ENGINEERS Alameda, California	**Baseline and Scenario Hydrographs**

Appendix D

Feasibility Study

Recycled Water Recharge

Bedford Subbasin

Prepared for Lee Lake Water District

LEE LAKE WATER DISTRICT

Feasibility Study

Recycled Water Recharge Bedford Subbasin

Prepared for Lee Lake Water District

May 2008

Todd Engineers

Feasibility Study
Recycled Water Recharge
in Bedford Subbasin

Prepared for:

Lee Lake Water District

22646 Temescal Canyon Road

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2490 Mariner Square Loop, Suite 215

Alameda, CA 94501-1080

May 2008

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1. Introduction

Lee Lake Water District (District) provides water and wastewater services to residents in the Temescal Valley south of the City of Corona. Tertiary treated wastewater from the Lee Lake Water Reclamation Facility (WRF) is currently being recycled for landscape irrigation and other non-potable uses. Excess recycled water is discharged to nearby Temescal Wash in compliance with regulatory requirements. The District is considering recharging the recycled water into the underlying groundwater basin, locally referred to as the Bedford Subbasin.

To evaluate the feasibility of the project, the District retained Todd Engineers to conduct a study of the Bedford Subbasin hydrogeology and evaluate potential recharge options. The location of the Bedford Subbasin and adjacent groundwater basins and subbasins are shown on Figure 1.

In a parallel effort, the District is coordinating with the City of Corona in the preparation of a Groundwater Management Plan (GWMP). The GWMP evaluates three groundwater subbasins within the City's water service area and recommends strategies for active groundwater basin management. The District's recharge project has been included in the GWMP as a potential management strategy. Three groundwater subbasins – Temescal, Coldwater, and Bedford subbasins – are included in the GWMP (Figure 1). Plan adoption is scheduled for June 2008.

The City and the District are also cooperating on the environmental review of the GWMP in compliance with the California Environmental Quality Act (CEQA). This process involves the preparation of a Programmatic Environmental Impact Report (PEIR). The District's recharge project for Bedford Subbasin is included in this review.

This technical memorandum summarizes the analyses and results of the hydrogeologic study and provides support for the GWMP, the PEIR, and the implementation of the District project.

1.1. Background

Lee Lake Water District was formed in 1965 to provide water and wastewater services to a growing population in the Temescal Valley area between Corona and Lake Elsinore (LLWD, 2008). The District currently serves about 4,400 residential and commercial customers within an approximate 10 square mile service area as shown on Figure 2. The City of Corona water service area is located primarily to the northwest, but overlaps a small portion of the District in the Bedford and Coldwater subbasins (Figure 2). Elsinore Valley Municipal Water District (EVMWD) is located south of the District, but also provides some water supply to portions of the Bedford Subbasin (Figure 2). Lee Lake Water District imports their water supply from Western Municipal Water District (WMWD) through the Metropolitan Water District State Water Project (SWP) system. The water is treated at the Mills Filtration Plan in Riverside and conveyed to the District through the Mills Pipeline.

The District also operates several groundwater wells in the subbasin and has historically used groundwater to supplement water supply. Although the wells have only produced a few acre feet per year (AFY) over the last several years, the District maintains these wells for anticipated future production. The District's project evaluated herein will enhance recharge in the subbasin to support increased future demand.

The District's wastewater services consist of three wastewater treatment plants: Butterfield Estates, California Meadows, and the District's Water Reclamation Facility (WRF). The WRF is located in the northern portion of the subbasin and provides tertiary treatment to reclaim the wastewater for reuse including landscape and golf course irrigation. Most of the demand for the recycled water occurs during the summer months. Recycled water that exceeds demand is discharged to nearby Temescal Wash. Currently, approximately 700,000 gallons per day (gpd) are discharged in compliance with NPDES Permit No. 8000100, administered by the California Regional Water Quality Control Board, Santa Ana Region (Water Board). The District's permits allow the expansion of their WRF to a full build-out capacity of 1,570,000 gpd.

1.2. Goals and Objectives

The goal of this evaluation is to identify feasible alternatives for recharge of tertiary treated wastewater into the Bedford Subbasin. The evaluation considered project feasibility on a technical and regulatory basis. Project objectives include the identification of recharge options involving various locations within the subbasin and various recharge methods (e.g., recharge basins or injection wells).

To meet these goals and objectives, Todd Engineers evaluated the hydrogeology of the Bedford Subbasin, assessed the technical feasibility of subbasin recharge, selected areas judged favorable for a recharge project, and identified potential regulatory constraints. Analyses and results of the study are summarized in this technical memorandum.

2. Hydrogeologic Setting

The hydrogeologic setting provides the framework for evaluation of the recharge project. This section summarizes groundwater conditions in the subbasin and presents specific analyses conducted for the project.

2.1. Study Area

The Study Area includes the Bedford Subbasin, covering approximately 6.5 square miles (4,133 acres) of the central Temescal Valley in western Riverside County. The Bedford Subbasin is a relatively small subdivision of the larger Elsinore Groundwater Basin (Figure 1). The Bedford and Coldwater subbasins form the northern portion of the Elsinore Groundwater Basin northwest of a bedrock constriction along Temescal Wash (Figure 1). According to current basin nomenclature used by the California Department of Water Resources (DWR), the Elsinore Groundwater Basin is not formally divided into subbasins (DWR, 2003). The Bedford and Coldwater subbasin nomenclature originates from former DWR basin boundaries in historical documents (DWR, 1959). Since the hydrogeologic conditions, including the bedrock constriction, clearly allow the subbasins to be evaluated separately from the remaining Elsinore Groundwater Basin to the southeast, the nomenclature is preserved in this analysis. Subbasins and contributing watershed areas, as digitized using Geographic Information System (GIS) software, are shown on Figure 1 and summarized on the table below.

Table 2-1
Groundwater Basins and Watersheds

DWR Groundwater Basin* (Basin No.)	Subbasin**	Area (acres)	Contributing Watershed (acres)
Elsinore (8-4)	Bedford	4,133	11,858
	Coldwater	2,176	9,525
	Elsinore	19,391	Not evaluated

*DWR, 2004.
**Bedford and Coldwater Subbasins defined and digitized for this project

2.1.1. Subbasin Boundaries

The Bedford Subbasin is defined by hydrologic and hydrogeologic boundaries. The eastern and southern boundaries are the approximate intersection of alluvial deposits with bedrock outcrops of the El Sobrante de San Jacinto hills (Figure 1). The Coldwater Subbasin lies to the west, separated from the Bedford Subbasin by the North Glen Ivy fault. The fault trace and the subbasin boundary shown on Figure 1 were recently modified from previous historical documents for the City of Corona's GWMP project. Revisions were based on recent geologic maps from the U.S. Geological Survey (USGS, 2004). On the northwest, the subbasin boundary is defined by the contact between alluvial sediments and the outcropping bedrock of the Santa Ana Mountains. The northern boundary of the Bedford Subbasin is generally defined by the southern edge of Bedford Canyon where the subbasin connects with the Temescal Subbasin of the larger Upper Santa Ana Valley Groundwater Basin (Figure 1).

The subbasin floor is characterized by a narrow sloping valley interrupted by bedrock outcrops and surrounded by uplands. Ground surface elevations range from above 1,300 feet above mean sea level (msl) in the southwest to about 800 feet msl at the northern subbasin boundary near the base of Bedford Canyon. Average ground surface elevations are about 1,000 feet over most of the subbasin. The nature of the land surface can be seen on the aerial photograph on Figure 3. The main drainageway is Temescal Wash (also locally referred to as Temescal Creek), which flows from south to north across the subbasin. Average annual rainfall on the basin is about 13 inches per year (OCS, 2007).

2.1.2. Land Use

The Bedford Subbasin has a rich history as an agricultural area supporting numerous crops including citrus. Through the 1950s and 1960s, almost all of the water use in the subbasin was for agriculture (DWR, 1965). At that time, water supply was a mix of local groundwater, local surface water and imported surface water. In 1954, Western Municipal Water District was annexed to Metropolitan Water District and began providing imported water from the Colorado River (stored at Lake Mathews) to the Temescal Valley (DWR, 1959). In recent years, the I-15 corridor of the Temescal Valley has experienced significant growth. Residential development can be seen on Figure 3 and is especially prevalent west of I-15. Residential communities such as the Retreat, Wildrose Ranch, California Meadows and others have been developed in the area, bringing additional landscaping and golf courses to the subbasin. The community of Dos Lagos has been developed east of I-15 in the northern portion of the subbasin. Commercial and light industrial development occurs along the east side of I-15 in the northern half of the subbasin. Large portions of the southern subbasin east of I-15 remain relatively undeveloped (Figure 3).

In the adjacent Coldwater Subbasin, residential development has occurred primarily in the northern half of the subbasin. The southern half of the Coldwater Subbasin is dominated by active and inactive sand and gravel mining operations (Figure 3). Both the District and EVMWD provide potable and non-potable water supply for Bedford and Coldwater subbasins.

2.1.3. Subbasin Hydrology

As shown on Figure 3, Temescal Wash is the main surface water drainage for both Coldwater and Bedford subbasins. The Santa Ana Region Water Board Basin Plan lists beneficial uses for the creek as groundwater recharge, water contact recreation, non-contact water recreation, warm water fish habitat, industrial service supply, and agricultural supply. Notwithstanding these designated uses, the creek is typically dry throughout most of the subbasin during the summer. The creek is tributary to the Santa Ana River and joins the main river channel at the Prado Management Area near Prado Dam (Figure 1).

Temescal Creek receives surface water runoff from contributing watersheds to the east and west (Figure 1). Although the eastern watersheds are slightly larger in area (approximately 11,858 acres) than the western watersheds (9,525 acres), runoff is generally lower. This is due to the lower elevations and lower average annual rainfall of about 13 to 16 inches per year (OCS, 2007; Environmental Solutions, 1994). This amount compares to an average annual rainfall of about 18 to more than 25 inches per year in the higher elevations west of Coldwater Subbasin. North of the Bedford Subbasin, the creek is fed by surface runoff from Bedford Canyon and rising groundwater in Temescal Canyon (Figure 1). North of Temescal Canyon, the creek flows into lined channels of the City of Corona's stormwater system and receives stormwater runoff from most of the Temescal Subbasin.

Surface water inflows into Bedford Subbasin along Temescal Wash are the result of runoff from surrounding areas. South of Bedford Subbasin, flows along the creek are diverted and bermed to create a small area of impounded surface water, locally known as Corona Lake (Figure 1). Historically, releases from this lake supplemented other agricultural water supplies. Currently, EVMWD provides non-potable supply to Coldwater and Bedford subbasins through releases from this impoundment, contributing to surface water inflows during summer months. Historically, overflow from Lake Elsinore (located about six miles south of Bedford Subbasin) provided surface water to the creek. However, increased water use in the vicinity halted surface water outflow from the lake in the early 1900s (DWR, 1959; MWH, 2003). With the exception of some upstream releases of recycled water to Temescal Creek there are no significant surface or subsurface inflows to the Bedford Subbasin from the Elsinore Subbasin to the south (MWH, 2003) (Figure 1).

2.2. Geology and Faulting

The Study Area is located within one of the structural blocks of the Peninsular Ranges of Southern California. The groundwater basins in this area occur in a linear low-lying block, referred to as the Elsinore-Temecula trough, between the Santa Ana Mountains on the west and the Perris Plain on the east (Norris and Webb, 1990). The trough extends from Corona to the southeast some 30 miles and was formed along an extensive northwest-southeast trending fault zone including the Elsinore, Chino, and related faults. The Elsinore and Chino fault zones bound the subbasins on the west and trend along the mountain front.

2.2.1. Geologic Units

Figure 4 presents a detailed geologic map illustrating the large number of units in the subbasin as mapped by USGS (2004). The oldest rocks in the Study Area crop out along the eastern edge or the Bedford subbasin. These uplands are composed principally of Mesozoic-age metasedimentary and volcanic rocks including the Estelle Mountain Volcanics (Mzu and Kvem, respectively, on Figure 4). There are also outcrops of Mesozoic metamorphic rocks including the Bedford Canyon Formation to the west of the subbasins in the Santa Ana Mountains (Jbc on Figure 4). Younger sedimentary units of Tertiary age crop out along the mountain front and in the subbasins. In northern Bedford Subbasin, a variety of Tertiary sedimentary units crop out including the Paleocene Silverado (Tsi), Miocene Vaqueros (Tvs), and Miocene Topanga (Tt) formations (Figure 4). Erosion of these units has filled in the trough over time resulting in quaternary-age alluvial fan, channel, and other alluvial deposits, making up the permeable portions of the Bedford and Coldwater groundwater subbasins.

The main surficial deposits on the floor of Bedford Subbasin include younger and older alluvial fans (Qvofg, Qofg, and Qy on Figure 4) deposited from the erosion of Bedford Canyon Formation and granitic rocks to the west. These units prograde across the basin to the northeast and are truncated by channel deposits along Temescal Wash (Qyag).

For analysis of the District's recharge project, similar alluvial and bedrock geologic units have been combined on Figure 5 to show the areal extent of relative high and low permeability units. The bedrock units, shown by the gray color, group together all of the consolidated units in the subbasin for a better understanding of low permeability areas to avoid for the recharge project. Alluvial deposits shown in the various shades of green illustrate the surface area of alluvial fans, valley fill, and channel deposits where more permeable sediments occur.

2.2.2. Depth to Bedrock

Although the geologic map shows alluvial sediments covering most of the surface of the Bedford Subbasin, the frequency of bedrock outcrops and shallow depth of many wells are good indications that sediments are likely very thin in some areas. For this reason a bedrock surface was interpolated for the subbasin. Depths to bedrock were noted from water well driller's logs obtained from the Department of Water Resources. The locations of these wells were approximately plotted using GIS software. The locations of these wells are shown on Figure 6. These data were combined with locations of known bedrock outcrops from the 2004 USGS geology map to create an approximate depth to bedrock surface. Figure 7 shows a colored raster and contours of the depth to bedrock surface. The bedrock surface map shows that sediments throughout most of the Bedford Subbasin are between 100 and 200 feet thick. Bedrock outcrops in the northern and south-central potion of the subbasin result in relatively thin and discontinuous pockets of alluvial sediments. However, there is an area in the western central portion of the subbasin where alluvial thickness is between 300 and 400 feet.

2.3. Subbasin Aquifers

The primary aquifer within the Bedford Subbasin is unconfined consisting of alluvial fan gravels prograding across valley fill sediments and interfingering with channel deposits associated with Temescal Wash. Although the alluvial aquifer is composed of material from multiple depositional environments, it is considered to be one continuous aquifer due to its high permeability and the prograding / interfingering nature of the deposits.

The bedrock in the subbasin does have some limited aquifer capacity, and there are some domestic wells that are completed in these bedrock aquifers. Bedrock aquifers in the area are primarily recharged from the alluvial aquifers. For the purpose of this study, the bedrock aquifers were not considered to be targets for recycled water recharge due to their limited capacity to store and transmit water.

2.3.1. Aquifer Geometry

The Bedford Subbasin alluvial aquifer is controlled by surface topography and the underlying erosional bedrock surface. The resulting aquifer is an elongated northwest southeast structure that is deepest in the middle, shallows to the north and east, is bounded by faults on the west, and is dotted by areas of no thickness where bedrock crops out. The aquifer generally slopes down to the northwest where it thins dramatically and is virtually nonexistent at the northern end of the subbasin.

The approximate latitudinal geometry of the alluvial fan deposits in the Coldwater and Bedford subbasins are shown on Figure 8. The cross section shows generalized subbasin geometry from west to east across the Coldwater/Bedford subbasin boundary at the North Glen Ivy fault. Rather than representative of a specific location, the cross section is a schematic profile illustrating the nature and maximum thickness of the alluvial fan aquifers and the relationship with the Temescal Wash deposits. Alluvial sediments are more than 800 feet thick in the Coldwater Subbasin and up to 500 feet thick in the Bedford Subbasin, with the thickest section occurring near the subbasin boundary and fault zone (Figure 8).

Water levels are lower in the western Coldwater Subbasin as a result of pumping by the City of Corona and others in the subbasin (Figure 8). The discontinuity indicated by water levels across the Glen Ivy fault reflects the commonly held view that groundwater is impeded by low permeability clay along the fault zone. This discontinuity has been observed in water levels on opposite sides of the fault by others (MWH, 2004)These and other data indicate that outflow from the Coldwater Subbasin into the Bedford Subbasin only occurs during times of high water levels (MWH, 2004).

2.3.2. Aquifer Parameters

Aquifer parameters for the alluvial aquifer in the Bedford Subbasin are not available throughout most of the subbasin. However, a 72-hour constant rate pumping test was performed on a District well, Well 1A, in February 2003 by Foothill Engine & Pump Company. Groundwater levels in Well 1A, and nearby Wells 3 and 4, were monitored during the test and recorded on field forms by the pumping contractor. The locations of the District wells are shown on Figure 6. No aquifer parameter analysis appears to have been conducted for these data. Therefore, data from this test were made available for analysis by the District as part of this project. Test data from the three wells were plotted on a semi-log graph of drawdown versus time. The graph of these data and the resulting straight line portions are shown on Figure 9. Straight line portions of the data were identified on this graph in order to apply the Cooper-Jacobs straight line approximation for the calculation of transmissivity (T) and storage coefficient (S) as shown by the following equations:

$$T = \frac{264Q}{\Delta s} \quad \text{and} \quad S = \frac{0.3Tt_0}{r^2}$$

Where T = transmissivity

S = storage coefficient

Q = pumping rate

Δs = drawdown for one log cycle

t_0 = time when drawdown equals zero

r = radius of observation point from pumping well

Data from Well 3 appeared to be the most representative of stabilized aquifer conditions and were less affected by the sporadic breaks in drawdown that were present in the data from Well 1A. Using these data, the calculated aquifer transmissivity is 144,000 gallons per day per foot (gpd/ft), equivalent to 19,250 square feet per day (ft^2/day). Storage coefficients were calculated for the straight lines from Wells 3 and 4 at 0.10 and 0.15, respectively. These values represent an effective porosity of the alluvial aquifer of 10 percent from Well 3 and 15 percent from Well 4. Well logs for District Wells 1A, 3, and 4 were not available for this analysis. However, nearby domestic well logs indicate a total saturated aquifer thickness of about 77 feet. Using this value for the saturated aquifer thickness (b), a hydraulic conductivity (K) of 250 feet per day (ft/day) was calculated for the aquifer using $K = T/b$. Because this represents the only K value available in the basin, it is unknown whether the data are representative. As such, a slightly lower K value of 200 ft/day is used for further analysis of the alluvial aquifer.

2.4. Groundwater Use and Wells

Groundwater has been used as an irrigation water supply in the Bedford Subbasin for at least 80 years. Published data on wells in the Temescal Valley indicate that at least eleven wells had been drilled for irrigation supply in the Bedford Subbasin (or just downgradient of the boundary) by 1957 (DWR, 1959). One shallow well was reported to have been in place since

1912. Driller reports obtained from DWR indicate that more than 100 wells have been drilled in the subbasin.

2.4.1. Subbasin Production

Groundwater pumping data are available from a private firm, Watermaster Support Services (WMSS), which compiles well and pumping data for the Temescal Valley subbasins and other basins in the Santa Ana River watershed. Data from 1947 through 2006 were obtained from WMSS and reviewed for this project. During this period, approximately 22 wells have extracted groundwater in the subbasin. These data include three irrigation wells that pump just outside of the subbasin at the mouth of Bedford Canyon (referred to as the EVWMD Flagler wells). Production from the Flagler wells is included in this analysis because they pump immediately downgradient of the subbasin and extract groundwater, in part, migrating out of the subbasin.

Annual groundwater production is shown on the top graph on Figure 10. As shown on the graph, Bedford Subbasin production has generally decreased over the last 60 years. From 1947 through 1965, annual production averaged 2,900 AFY. Groundwater pumping increased from 1966 through 1971, averaging about 4,000 AFY with a peak in 1966 of 4,658 AFY. Through the 1970s and into the early 1990s, average production declined to about 2,500 AFY. Since 2000, production has declined to about 1,000 AFY and averaged only 245 AFY in 2005-2006.

Several water companies were formed in the subbasin before 1950 to provide irrigation water for subbasin agriculture (DWR, 1959). These companies secured surface and groundwater supplies and operated several groundwater wells in the subbasin. When the District was formed in 1965, two existing production wells were acquired to supplement the District's imported water supply. Production from these two wells by the District and previous well owners are summarized on the graph on the bottom of Figure 10. As shown on the graph, production from the District wells has also declined over time. From 1947 through 1970, production averaged about 676 AFY, accounting for about 20 percent of the documented subbasin pumping. From 1972 through 1995, average production declined by more than one half to 274 AFY (about 10 percent of subbasin production). Over the last 10 years, production has declined to less than 20 AFY and the wells are not currently used for potable water supply.

2.4.2. Domestic Wells

Although there is very little documented domestic groundwater extraction from the subbasin, private wells used for domestic water supply likely exist in the basin. DWR driller's logs indicate that some wells were previously permitted for domestic supply as well as irrigation. The number of active wells is not known. The drilling of domestic wells (and other wells) requires a permit to be filed with Riverside County Division of Environmental Health (DEH). The County maintains these well permits in their records and compiles information into a database as internal resources allow. Communication with the County revealed that their databases does not currently allow for geographic filtering of well information and therefore accessing the data for Bedford Subbasin wells would require considerable effort on the part of County staff. Unfortunately, due to current staffing levels, the County cannot accommodate this type of search in a timely manner. As such, permit data were not reviewed for this project.

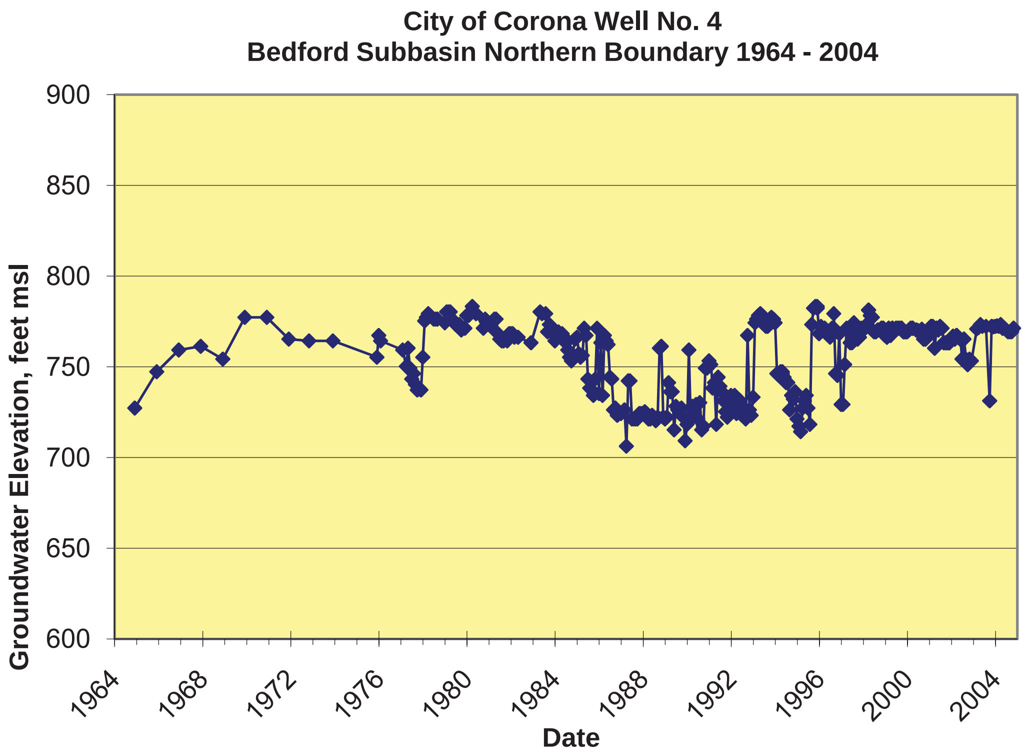
2.5. Groundwater Occurrence and Flow

Groundwater occurrence in the unconfined aquifer of the Bedford Subbasin is controlled by recharge and outflow. The primary source of recharge to the alluvial aquifer is runoff from the watershed to the east and percolation of precipitation. Additional runoff enters the basin and the aquifer from the west, but this must first travel through the Coldwater Subbasin, where most of the water infiltrates. Some additional recharge also occurs as a result of subsurface inflow from the alluvial aquifer in the Coldwater Subbasin. However, this recharge source is limited by groundwater pumping in Coldwater Subbasin and impedance across the Glen Ivy fault. Very little, if any, groundwater enters the subbasin from Lake Elsinore due to its limited releases. Groundwater flow in the subbasin is generally easterly toward Temescal Wash and then northwesterly following surface water drainage.

2.5.1. Water Levels and Depth to Water

Very few wells in the Bedford Subbasin provide a sufficient water level record to analyze long term trends. However, there are scattered wells throughout the subbasin with original static water levels from water well driller’s logs. These water levels were recorded at the time of installation of the wells shown on Figure 6. Since these wells have been constructed over a period of approximately 50 years spanning various hydrologic conditions, it can be reasonably assumed that they collectively approximate average static water levels. Contours of the depth to groundwater, as shown on Figure 11, were created using these data. In addition, there are a number of wells near the northeast outflow of the subbasin that allow for an analysis of water levels at that location (Figure 6). As shown on Figure 11, groundwater is deepest in the western portion of the subbasin (up to about 100 feet deep). Shallower groundwater occurs in the eastern subbasin near Temescal Wash. The exact groundwater-surface water interaction along the wash has not been documented, but groundwater likely provides baseflow to the creek in shallow bedrock areas and the creek likely recharges groundwater where water levels are deeper. As Temescal Wash exits the subbasin in the northeast, groundwater discharge likely occurs.

One former well, operated by the City of Corona (Well 4), is located about 950 feet north of the northeast corner of Bedford Subbasin at the mouth of Bedford Canyon. Wells pumping in this area receive recharge from runoff in adjacent Bedford Canyon (Temescal Subbasin) as well as surface and subsurface outflow from Bedford Subbasin (Figure 1). As such, water levels in this area are indicative of the total groundwater and surface water discharge where Temescal Wash temporarily leaves the subbasins. A hydrograph from this Bedford Canyon well is shown below.



The ground surface elevation at this well is reported to be about 791 feet msl indicating that water levels are within 10 feet of the ground surface during times of high water levels. This is to be expected given the downgradient location of the well and its position near rising groundwater that enters Temescal Canyon as surface water in the wash. Downstream ground surface elevations are around 780 feet, similar to water levels in the well. It appears that this elevation is acting similar to a drain, and likely indicates the level at which the groundwater basin is discharging to Temescal Wash. Given the shallow groundwater, this location would not be applicable to a District recharge project; nonetheless the hydrograph provides a record for long-term water levels at the downgradient extent of the subbasin.

As shown on the hydrograph, water levels have fluctuated only about 60 feet over the last 40 years. Water levels have been recorded as high as 782 feet, but have remained above about 770 feet for most of the period of record. Water levels dropped to around 720 feet during the relatively dry cycle from 1987 to 1995. According to a DWR study (1980), groundwater levels in the Bedford Subbasin fluctuate considerably during the year as a result of seasonal pumping and considerable recovery of water levels during the rainy season. This observation indicates that infiltration of recycled water at the surface can readily recharge the alluvial aquifers.

2.5.2. Groundwater Flow

Most of the subsurface flow in the Bedford Subbasin parallels surface water flow to the northwest along Temescal Wash. However, flow is easterly in the western portion of the subbasin, generally following surface topography. In the northern portion of the subbasin, groundwater flow becomes more complex as a result of refraction around low permeability bedrock. Throughout the subbasin, groundwater flow is generally controlled by surface topography.

2.5.3. Groundwater Quality

Groundwater quality data for the Bedford Subbasin alluvial aquifer at this time are limited to samples collected from District Well 1A in February 2003 and in Well 4 in August 2007. A complete list of analytical parameters and the concentrations at which they were detected is presented in the following table.

Table 2-2
Groundwater Quality Data
District Wells 1A & 4

Well		Well 1A	Well 4
Sample Date		2/5/2003	8/20/2007
pH	mg/L	--	7.1
Calcium	mg/L	--	110
Magnesium	mg/L	--	23
Nitrate as N	mg/L	--	1.2
Nitrite as N	mg/L	--	< 0.1
Ammonia	mg/L	--	0.43
Sulfide	mg/L	< 0.10	--
Total Hardness	mg/L	--	370
Total Dissolved Solids	mg/L	--	690
Total Suspended Solids	mg/L	< 5	--
Chlorine Residual	mg/L	< 0.10	--
Oil & Grease	mg/L	< 5	--

As shown by the values for total dissolved solids (TDS), groundwater contains a relatively high mineral content in the subbasin. The TDS value of 690 mg/L exceeds the secondary maximum contaminant level (MCL) of 500 mg/L. This MCL is not based on health risk, but rather aesthetic values such as odor or taste. The value of total hardness of 370 mg/L indicates a water classified as *very hard* (Todd and Mays, 2005), which can result in scale deposition in pipes and other inconveniences. Preliminary review of these data indicates that recycled water may be of higher quality for some constituents than ambient groundwater. Recycled water quality data are reviewed in the following section.

3. Considerations for Groundwater Recharge

The District's recharge project was evaluated in the context of the hydrogeologic setting of the subbasin and District objectives. Based on this analysis, potential recharge locations and methods were selected. This section describes the evaluation and provides project parameters, methods of analysis, assumptions, regulatory considerations, and results.

3.1. Recharge Water Parameters

Based on communication with the District and a review of current permit requirements and data, the following parameters and data have been incorporated into the analysis.

3.1.1. Quantity Available for Recharge

In compliance with the current NPDES permit, the District can discharge up to 1,570,000 gpd of recycled water to Temescal Creek. The District is currently discharging about 700,000 gpd during non-irrigation months. The recycled water demand is much larger in summer months and discharge to the creek is significantly reduced during that time. The WRF is capable of reclaiming up to about 1,570,000 gpd, but demand for recycled water is also expected to rise (LLWD, 2008). For the purposes of this preliminary analysis, we assume that a current continuous flow of 700,000 gpd is available for recharge on a six-month basis. This amount is equivalent to a continuous recharge rate of 486 gpm. The recharge method and location selected for the District's project needs to accommodate this rate and amount. Additional recycled water will likely be available in the future although the exact amount is unknown. Even though the analysis is based on 700,000 gpd, the potential for increasing this amount is also considered.

3.1.2. Recycled Water Quality

The WRF produces tertiary-treated wastewater derived from imported SWP water. This water source is considered to be higher quality than local groundwater for many parameters. According to a 2006 report to consumers, the imported water contains an average TDS of 200 mg/L (LLWD, 2006) compared to a groundwater supply of about 690 mg/L. Although mineral content is concentrated in the wastewater, elevating the TDS, the recycled water is expected to be equal to or better than ambient groundwater quality.

Water quality data from the WRF are available in connection with the District's monitoring program. These data were provided by the District and reviewed for application to the recharge project. Table 3-1 presents a summary of recycled water data with a focus on the parameters relevant to recycled water recharge regulations (Section 60320.030 in DPH, 2007). The table is presented on the following pages and described in the text following the table.

Table 3-1
Recycled Water Analytical Results Average Concentrations 2002 - 2007

ANALYTE (*Italics* - required for recharge project by DPH)	Average Result (**bold underline** - exceeds MCL or Secondary MCL)	Number of Detections	Number of Non-Detect Results (ND)	Maximum Contaminant Level (MCL)	Secondary MCL	Units
Aluminum	Not Analyzed	--	--	1	0.2	mg/L
Antimony	ND	0	1	0.006		mg/L
Arsenic	0.011	1	6	0.05		mg/L
Asbestos	Not Analyzed	--	--	7		MFL
Barium	ND	0	7	1		mg/L
Beryllium	ND	0	1	0.004		mg/L
Cadmium	ND	0	7	0.005		mg/L
Calcium	29	62	1	--		mg/L
Chloride	149	63	1	--	250	mg/L
Chromium (Total)	ND	0	7	0.05		mg/L
Chromium (Hexavalent)	ND	0	13	0.05		mg/L
Copper	0.0305	4	62	1.3	1	mg/L
Cyanide	ND	0	7	0.15		mg/L
Fluoride	Not Analyzed	--	--	2		mg/L
Iron	0.09	2	5	--	0.3	mg/L
Lead	ND	0	7	0.015		mg/L
Magnesium	12	62	1	--		mg/L
Manganese	0.019	6	1	--	0.05	mg/L
Mercury	ND	0	18	0.002		mg/L
Nickel	ND	0	1	0.1		mg/L
Nitrate as N	3.5	249	10	10		mg/L
Nitrite as N	0.96	84	176	1		mg/L
Nitrogen (as Ammonia)	4.5	148	114	--	1.5	mg/L
Total Nitrogen (ammonia, nitrate, & nitrite)	9.0	Calculation	Calculation	*		mg/L
Inorganic Nitrogen	6.4	252	8	--		mg/L
Biochemical Oxygen Demand	10	49	213	--		mg/L
Perchlorate	Not Analyzed	--	--	0.006		mg/L
Selenium	0.0043	46	21	0.05		mg/L
Silver	ND	0	17	--	0.1	mg/L
Sodium	128	63	1	--		mg/L
Sulfate	96	62	2	--	250	mg/L
Thallium	ND	0	1	0.002		mg/L
Bicarbonate	Not Analyzed	--	--	--		mg/L
Carbonate	Not Analyzed	--	--	--		mg/L
Alkalinity	Not Analyzed	--	--	--		mg/L
Total Hardness	122	63	1	--		mg/L
Zinc	0.054	7	0	--	5.0	mg/L
pH	7.3	59	0	--		Standard Units
Foaming Agents (MBAS)	Not Analyzed	--	--	--	0.5	mg/L
Turbidity	Not Analyzed	--	--	--	5.0	NTU
Total Dissolved Solids	**<u>554</u>**	66	0	--	500**	mg/L
Total Suspended Solids	14	14	248	--		mg/L
Total Coliform	2.8	5	20	--		MPN/100mL
Total Organic Carbon	Not Analyzed			16***		mg/L

Table 3-1
Recycled Water Analytical Results Average Concentrations 2002 - 2007

ANALYTE (*Italics* - required for recharge project by DPH)	Average Result (**bold underline** - exceeds MCL or Secondary MCL)	Number of Detections	Number of Non-Detect Results (ND)	Maximum Contaminant Level (MCL)	Secondary MCL	Units
Radium-226	Not Analyzed	--	--	5 (combined)		pCi/L
Radium-228	Not Analyzed	--	--			pCi/L
Gross Alpha	Not Analyzed	--	--	15		pCi/L
Uranium	Not Analyzed	--	--	20		pCi/L
Beta / photon emitters	Not Analyzed	--	--	4		millirem/year
Strontium-90	Not Analyzed	--	--	8		pCi/L
Tritium	Not Analyzed	--	--	20,000		pCi/L
1,1,1-Trichloroethane	ND	0	3	0.200		mg/L
1,1,2,2-Tetrachloroethane	ND	0	3	0.001		mg/L
1,1,2-Trichloro-1,2,2-Trifluoroethane	Not Analyzed	--	--	1.2		mg/L
1,1,2-Trichloroethane	ND	0	3	0.005		mg/L
1,1-Dichloroethane	ND	0	3	0.005		mg/L
1,1-Dichloroethylene	ND	0	3	0.006		mg/L
1,2,4-Trichlorobenzene	ND	0	3	0.005		mg/L
1,2-Dichlorobenzene	ND	0	6	0.6		mg/L
1,2-Dichloroethane	ND	0	3	0.0005		mg/L
1,2-Dichloropropane	ND	0	3	0.005		mg/L
1,3-Dichloropropene	Not Analyzed	--	--	0.0005		mg/L
cis-1,3-Dichloropropene	ND	0	3	--		mg/L
trans-1,3-Dichloropropene	ND	0	3	--		mg/L
1,4-Dichlorobenzene	ND	0	6	0.005		mg/L
2,3,7,8-TCDD	Not Analyzed	--	--	0.00000003		mg/L
2,4,5-TP	Not Analyzed	--	--	0.05		mg/L
2,4-D	Not Analyzed	--	--	0.07		mg/L
Alachlor	Not Analyzed	--	--	0.002		mg/L
Atrazine	Not Analyzed	--	--	0.001		mg/L
Bentazon	Not Analyzed	--	--	0.018		mg/L
Benzene	ND	0	3	0.001		mg/L
Benzo(a)pyrene	ND	0	3	0.0002		mg/L
Bromodichloromethane	0.03	0	3	0.08		mg/L
Carbofuran	Not Analyzed	--	--	0.018		mg/L
Carbon Tetrachloride	ND	0	3	0.0005		mg/L
Chlordane	ND	0	3	0.0001		mg/L
Chloroform	0.009	0	3	0.08		mg/L
cis-1,2-Dichloroethylene	Not Analyzed	--	--	0.006		mg/L
Dalapon	Not Analyzed	--	--	0.2		mg/L
Di(2-ethylhexyl)adipate	Not Analyzed	--	--	0.4		mg/L
Di(2-ethylhexyl)phthalate	ND	0	3	0.004		mg/L
Dibromochloropropane	Not Analyzed	--	--	0.0002		mg/L
Dichloromethane	ND	0	3	0.005		mg/L
Dinoseb	Not Analyzed	--	--	0.007		mg/L
Diquat	Not Analyzed	--	--	0.02		mg/L
Endothal	Not Analyzed	--	--	0.1		mg/L
Endrin	ND	0	6	0.002		mg/L
Ethylbenzene	ND	0	3	0.3		mg/L
Ethylene Dibromide	Not Analyzed	--	--	0.00005		mg/L
Glyphosate	Not Analyzed	--	--	0.7		mg/L
Heptachlor	ND	0	6	0.00001		mg/L
Heptachlor Epoxide	ND	0	6	0.00001		mg/L
Hexachlorobenzene	ND	0	3	0.001		mg/L
Hexachlorocylopentadiene	ND	0	3	0.05		mg/L

Table 3-1
Recycled Water Analytical Results Average Concentrations 2002 - 2007

ANALYTE (*Italics* - required for recharge project by DPH)	Average Result (**bold underline** - exceeds MCL or Secondary MCL)	Number of Detections	Number of Non-Detect Results (ND)	Maximum Contaminant Level (MCL)	Secondary MCL	Units
Lindane	ND	0	6	0.0002		mg/L
Methoxychlor	ND	0	3	0.03		mg/L
Methyl-tert-butyl ether (MTBE)	ND	0	3	0.013	0.005	mg/L
Molinate	Not Analyzed	--	--	0.02		mg/L
Monochlorobenzene	ND	0	3	0.07		mg/L
Oxamyl	Not Analyzed	--	--	0.05		mg/L
Pentachlorophenol	ND	0	3	0.001		mg/L
Picloram	Not Analyzed	--	--	0.5		mg/L
Polychlorinated Biphenyls	Not Analyzed	--	--	0.0005		mg/L
Simazine	Not Analyzed	--	--	0.004		mg/L
Styrene	Not Analyzed	--	--	0.1		mg/L
Tetrachloroethylene	ND	0	3	0.005		mg/L
Thiobencarb	Not Analyzed	--	--	0.07	0.001	mg/L
Toluene	0.007	1	2	0.15		mg/L
Toxaphene	ND	0	6	0.003		mg/L
trans-1,2-Dichloroethylene	ND	0	3	0.01		mg/L
Trichloroethene	ND	0	3	0.005		mg/L
Trichlorofluoromethane	ND	0	3	0.5		mg/L
Vinyl Chloride	ND	0	3	0.0005		mg/L
Xylenes	ND	0	3	1.750		mg/L

*See recycled water regulations for limits on total nitrogen and disinfection byproducts
**For TDS, regulations allow upper exceedances of 1,000 mg/L and short-term exceedances of 1,500 mg/L
*** Regulatory requirements for TOC may be lower than MCL

Table 3-1 presents concentrations of metals and other inorganic constituents and physical parameters in the first grouping of analytes. These data are followed by radionuclides that are required for monitoring of recycled water recharge. The last group of analytes contains organic chemicals. Also included on the table are primary and secondary maximum contaminant levels (MCLs) pertinent to regulations for recharge of recycled water (DPH, 2007). Concentrations listed in the column of *Average Result* are average concentrations of detections from 2002 through 2007 and do not consider samples when the concentration was not detected above reporting detection limits (Table 3-1).

As shown on Table 3-1, the District's recycled water appears to meet regulatory requirements for constituents analyzed to date. The average TDS is about 555 mg/L, slightly larger than the secondary MCL of 500 mg/L. However, this is lower than the TDS concentration detected in the limited groundwater data presented above. As noted at the bottom of the table, TDS concentrations above 500 mg/L may be recharged and short-term concentrations of up to 1,500 mg/L may be allowed.

Regulations require control of total nitrogen compounds in recharge water. Total nitrogen as defined by the regulations is the sum of nitrogen in ammonia, nitrite, nitrate and other organic nitrogen-containing compounds. Total nitrogen is calculated on Table 3-1 and averages 8.8 mg/L. Total nitrogen may be limited to as low as 5 mg/L for a recharge project. If the 5 mg/L objective is exceeded, additional groundwater monitoring and/ or blending will likely be required to demonstrate that groundwater quality has not been adversely impacted. Regulations allow for alternative concentration limits to be proposed for a recycled water recharge permit (DPH, 2007). Nitrate, one of the nitrogen compounds of particular concern, meets primary standards as shown on Table 3-1. Concentrations of nitrate (as N) in recycled water average 3.4 mg/L from more than 261 samples analyzed. This value is well below the MCL of 10 mg/L.

Radionuclide data are currently unavailable for the WRF water. The seven parameters listed on Table 3-1 summarize the regulated analytes.

Organic chemicals regulated for recycled water recharge are listed on Table 3-1 beginning on the second page of the table. Almost all of these chemical have been analyzed in recycled water in at least one sampling event since 2002. Most of the data were developed during two sampling events in 2005 (winter and summer) and one event in January 2007. For those sampling events, there have been no detections of any organic chemical that did not meet water quality standards for regulated compounds. Two organic chemicals detected are classified as trihalomethanes (THMs), a group of chemicals formed when chlorine is used to control microbial contaminants in water (referred to collectively as disinfection byproducts). Analyses of THMs include chloroform, bromodichloromethane, dibromochloromethane, and bromoform. Of these chemicals, chloroform and bromodichloromethane have been detected in recycled water samples. Chloroform has been detected in three samples at 0.0026 mg/L, 0.008 mg/L, and 0.015 mg/L. All detections meet water quality standards and were significantly lower than the MCL of 0.080

mg/L. Bromodichloromethane has also been detected in three samples at concentrations of 0.009 mg/L, 0.002 mg/L, and 0.0063 mg/L, all at least one order of magnitude below the MCL of 0.080 mg/L. Only one other organic contaminant, toluene, has been detected in effluent samples. The concentration of that detection (0.007 mg/L) was about two orders of magnitude lower than the MCL of 0.15 mg/L.

As shown on the table, radionuclides and several inorganic and organic constituents have not yet been analyzed in District recycled water because they are not required for current monitoring. The table contains a more complete list of constituents to allow the District to review additional constituents to be analyzed for the recharge project if implemented. In addition to the constituents and parameters provided on Table 3-1, total organic carbon must meet stringent regulatory requirements. DPH will also require initial testing and monitoring for specific non-regulated compounds.

3.2. Hydrogeologic Considerations

Hydrogeologic conditions within the groundwater subbasin are important to the performance of a successful recharge project. The vadose zone above the water table must be sufficiently permeable to percolate the recharge water and there must be sufficient storage to accommodate the water during the recharge period. Aquifers must be sufficiently permeable to transmit the recharge water downgradient toward the basin discharge point or extraction wells. During an evaluation of recharge sites in the Lucerne Valley, USGS developed a general list of criteria for site selection. Although the list is specific to large spreading basins, the criteria are applicable to many recharge sites and methods. These criteria are listed below:

1. The infiltration rate of the spreading grounds must be high enough to accept the anticipated rate of recharge.
2. The storage capacity of the groundwater basin must be adequate to accommodate the anticipated volume of recharge.
3. The transmissivity of the water-bearing material must be sufficient to transmit the water at an acceptable rate away from the recharge site toward the area of extraction.
4. An adequate supply of water must be available for recharge, and it must be close enough to the area of need to meet economic criteria.
5. The spreading grounds should be upgradient of the withdrawal areas or be so situated with respect to withdrawal areas that water moves as directly as possible from one area to the other.
6. Faults and other hydrogeologic barriers should not impede the movement of recharge water.
7. The recharge water should be compared geochemically with ambient groundwater to minimize mineral precipitation and clogging of the aquifer with consequent reduction in rates of recharge.

For application to the District's recharge project, criteria 1-3 above are considered the most critical for project success. Data relevant to the infiltration potential, storage capacity, and transmissivity were discussed in the hydrogeologic setting. Although site-specific tests have not yet been conducted to determine infiltration rates, surface alluvial sediments are judged generally adequate for sufficient infiltration. Soil mapping conducted by the U.S. Natural Resources Conservation Service (NRCS) indicates permeable soils over the entire subbasin except in areas where bedrock crops out (NRCS, 2006). The transmissivity of the aquifers, as indicated by the aquifer test at District Well 1A, indicates sufficient permeability for downgradient transport of recharge water away from the recharge site and toward extraction wells. The exact storage capacity of the groundwater basin is currently unknown. Most of the storage is in the alluvial sediments that have infilled the basin around areas of shallow bedrock. The surface area of the subbasin is approximately 4,133 acres, but includes areas of bedrock and negligible groundwater storage. Using reasonable assumptions of two-thirds of the surface area (2,769 acres), an average depth to water of 50 feet, and an S value of 0.15, available subbasin storage is estimated to be about 20,000 AF. Storage estimates are judged adequate for the relatively small volume of recharge considered for this project, approximately 400 AFY of current discharge and 900 AFY at full permitted plant capacity assuming six months of continuous recharge. In addition, both the District and others have indicated an interest in additional extraction in the subbasin, making enhanced recharge a critical component of groundwater management.

Criterion 4 addresses the availability of source water for the project. WRF capacity and water quality data indicate that a reasonable amount of recycled water of sufficient quality is available. In addition, the current and planned conveyance system for recycled water anticipates increased demand throughout most of the subbasin. As such, sites within the central and northern Bedford Subbasin are considered sufficiently close to the recycled water conveyance system for the purposes of this feasibility study. If the project moves forward, final site selection will consider distance to conveyance and costs.

With regard to criterion 5, the upgradient (southern) portion of the subbasin was considered to be higher priority and was targeted for site selection. This criterion was balanced with the need for more favorable aquifer conditions than exist in the most upgradient portion of the subbasin where bedrock crops out, aquifers are thin, and the water table is shallow.

Criterion 6 notes the need to understand subbasin hydrogeology and potential barriers to groundwater flow. Geologic faults, such as the Glen Ivy fault on the western subbasin boundary, have been observed to impede groundwater flow in the area. Additional faults impacting groundwater flow have not been identified within the central and northeastern portions of the Bedford Subbasin. As such, specific faults are not considered to limit project site selection. Bedrock outcrops of the Bedford Subbasin are also considered to be hydrogeologic barriers, where low permeability rock impedes and diverts groundwater flow. Recent mapping in the area by USGS provided guidance on more favorable areas based on surface geology. For this project, Todd Engineers also constructed a detailed map on the depth to bedrock across the subbasin based on existing data (Figure 7). This map was used to identify more favorable areas away from shallow bedrock.

The final criterion in the previous list, criterion 7, addresses the compatibility of the recharge water and ambient groundwater to ensure long-term infiltration can be sustained without well or aquifer damage. This compatibility issue is typically evaluated using geochemical models, such as the USGS-developed model PHREEQC (Parkhurst and Appelo, 1999). Data are currently insufficient to conduct geochemical modeling. Site-specific data will need to be collected for this evaluation after a project site is selected.

3.2.1. Potential Recharge Methods

To replenish the unconfined alluvial aquifer, recycled water can be applied in one of several ways: at the surface using infiltration basins, directly into the aquifer using injection wells, or into the subsurface above the water table using vadose zone wells. Each of these recharge methods are illustrated by the schematic diagram on Figure 12. For surface basins, water infiltrates the basin floor and percolates through the vadose zone to the underlying water table (Figure 12). If clay layers are present in the vadose zone, or if sufficient land for recharge basins is unavailable, vadose zone wells can provide a space-efficient pathway for project water to reach the water table. If clay layers are prevalent, especially if they represent confining layers in the aquifer system, injection wells can be used to access aquifers more directly for recharge. Either of these methods, or a combination of methods, could potentially be applied to the District's recharge project. The applicability of each method to the District's project is discussed below.

3.2.1.1. Surface Basins

The use of surface recharge basins involves conveyance of recycled water to a shallow excavated basin or series of basins where water would pond and infiltrate to underlying groundwater. Recharge basins have been used for conjunctive use and enhanced recharge projects for almost a century in areas of Riverside and San Bernardino counties. Since the alluvial aquifers of the Bedford Subbasin are considered to be unconfined, surface recharge would likely be capable of replenishment of subbasin aquifers. The size of the basin depends on the amount of water to be recharged and infiltration rates.

The infiltration rate varies with vadose zone permeability, depth to water, water quality, and other factors. Infiltration rates tend to decrease over time due to physical and/or biological clogging of the basin floor. Maintenance often involves drying and re-working the shallow subsurface. Physical clogging is anticipated to be less with recycled water, given the low amount of suspended solids. To maximize infiltration rates, relatively shallow basins are preferred (Bouwer, 2002).

Using a typical infiltration rate of about two feet per day (ft/day), a one-acre area is calculated to be capable of recharging about 450 gpm, a rate similar to that required for the District project. However, to allow for basin edge effects, maintenance, and other project needs, a minimum area of two acres should be considered.

Surface recharge basins provide the following project benefits:

- Relatively simple to construct and maintain
- Ability to spread recharge water over a large area, minimizing water levels impacts
- Water quality benefits by filtration through the vadose zone
- Ability to rehabilitate shallow clogging problems

Several disadvantages are associated with surface recharge basins compared to other recharge methods including:

- Larger land requirements
- Relatively large environmental footprint
- Potential security and liability issues

3.2.1.2. Vadose Zone Wells

If sufficient land is unavailable for the construction of relatively large surface basins, vadose zone wells can be used. These wells, also referred to as dry wells, consist of an engineered casing/screen/gravel pack assembly installed in a shallow boring above the water table. Vadose zone wells can also be used to by-pass shallow clay layers that may impede or divert percolating recharge water (Figure 12). The amount of clay in the vadose zone throughout the Bedford Subbasin is unknown, but is predicted to be relatively low. Thus, this may not be an important advantage for the District’s project. Nonetheless, wells are relatively inexpensive to construct and use, especially for the amounts of water to be recharged in this project. Vadose zone wells can be constructed in a developed area and need relatively small areas for installation and operation. In addition, they can be constructed on several separate parcels, if needed, allowing for a series of smaller projects rather than one larger recharge project. If infiltration rates are relatively high, only a few vadose zone wells would likely be needed to accommodate the District’s project.

One major disadvantage is the inability to rehabilitate wells should they become clogged or ineffective. The entrainment of air is often cited for problems with decreasing infiltration rates. However, it is relatively easy to abandon and replace wells as needed.

3.2.1.3. Injection Wells

For more direct recharge into the aquifer, injection wells can be used. These wells are constructed similar to production wells, but are configured for injection. Wells are effective in areas of relatively shallow water tables or for confined aquifers. Because well clogging typically decreases injection rates over time, wells need to be pumped periodically for maintenance, a process referred to as backflushing. The frequency of required backflushing varies from project to project, but is assumed to be required on a bi-weekly or monthly basis. Pumping for backflushing is typically conducted at twice the injection rate. As such, a dedicated pump is usually installed in the injection well with a flow control valve that allows for both injection and pumping to occur in the same wellbore.

Injection wells cost more to install than vadose zone wells and are often associated with significant maintenance costs. Land requirements are typically smaller than for surface recharge basins, but larger than for vadose zone wells since pumping and backflushing operations must be accommodated. However, they can serve as an effective method of recharge.

3.2.1.4. Recharge Methods for District Project

As discussed above, any of the three methods could be applicable for recycled water recharge in the Bedford Subbasin. For a conceptual cost comparison, a recharge basin may be the less expensive alternative if land costs are not considered. The process of constructing a shallow basin is relatively straightforward and fewer inaccessible project components are developed. However, because of the larger land requirement, this method could also easily be the most expensive method depending on land costs. Injection wells would be relatively shallow for this project and would not likely be cost prohibitive. However, the clogging issues and backflushing requirements add significantly to project risk. Existing wells would not be good candidates for use as injection wells, given the lack of construction information, well seals, and the desire by the District to pump wells for water supply in the future. Recharge regulations require a minimum distance from drinking water wells. Vadose zone wells are likely the least expensive recharge option when land costs are considered. Since injection capacity is relatively low for vadose zone wells compared to recharge basins, numerous wells are often required to support a recharge project. However, for the small volume of recharge water associated with this project, this alternative seems slightly more favorable. Because all methods appear feasible, none are eliminated for the purposes of this study. Detailed costs can be generated when a specific site and data are available, and a method can be selected at that time.

3.2.2. Selection of Favorable Areas

For the purpose of this feasibility study, three favorable areas were chosen as potential recharge sites. A variety of factors were analyzed in order to select these favorable areas including:

- Depth to bedrock / alluvial thickness
- Depth to groundwater
- Land Use
- Soil / vadose zone lithology and permeability
- Distance to aquifer boundaries
- Ease of obtaining land

As a result of this analysis, the basin was subdivided into five priority zones, with Priority 1 being the most favorable and Priority 5 the least. The distribution of the zones is presented on Figure 13. The areas indicated as Priority 1 were chosen as the most suitable locations for potential recharge facilities. Areas at and near outcrops of bedrock are rated the lowest priority as shown by the gray areas of the subbasin on Figure 13. The southern segment of the subbasin is rated relatively low (Priority 4), even though alluvial deposits and depth to groundwater may present favorable conditions. This low rating is due to the concern that recharge water would be discharged to Temescal Wash as the creek crosses an area of very thin sediments to the north, removing the project water from the groundwater basin without adding to subbasin yield. Areas designated Priority 3 were judged too close to the creek and areas of shallow groundwater and land use considerations. Priority areas 2 were so-designated based on land use and, to some extent, less certainty in hydrogeology. Priority areas 1 were carried forward for further evaluation.

The District currently produces up to 700,000 gallons per day (gpd) of recycled water for potential recharge, an amount equivalent to 2.15 AF/day. The District is permitted to produce 1,570,000 gpd (4.82 AF/day) of recycled water at full build-out. Assuming a conservative recharge rate of 2 ft/day (only one percent of the measured hydraulic conductivity of the aquifer), a recharge basin with a minimum of 1.07 acre infiltration area (wetted area within a recharge basin) would be sufficient to recharge the current quantity of WFR water. For full build-out, a recharge basin with a minimum of 2.41 acres of infiltration area would be required. These parameters are used to evaluate project impacts to subbasin water levels as described below.

3.2.3. Groundwater Mounding Estimates

Potential recharge basins were plotted in each of the Priority 1 areas as shown on Figure 14. The depth to bedrock and depth to groundwater were interpolated for each of these three locations from the bedrock and groundwater surfaces on Figures 7 and 11. At Site 1 the interpolated depth to bedrock is 165 feet and the depth to groundwater is 40 feet, giving an approximate aquifer thickness of 120 feet. At Sites 2 and 3 the interpolated depth to bedrock is 370 feet and the depth to groundwater is 75 feet, giving an approximate aquifer thickness of 295 feet. The red area shown on the figure at Sites 1 and 3 covers approximately five acres, which is about the size necessary for the berms and other structures associated with a recharge basin with a one- to two-acre infiltration area. The blue area in the center of each of the three basins is just over one acre and represents the potential minimum size of the necessary infiltration area.

For a surface recharge project, water levels rise beneath the recharge area creating a groundwater mound. The height and extent of this mound varies over time with hydraulic properties of the aquifer and the amount of water being recharged. The development of a groundwater mound beneath the Study Area was evaluated using an analytical equation developed by Hantush (1967). The Hantush equation estimates the height of the groundwater recharge mound as a function of time and distance from the recharge area. The Hantush equation assumes that the underlying aquifer is unconfined, homogeneous, isotropic, and effectively infinite in areal extent. The analysis does not account for travel time and lateral flow of recharge water through the unsaturated zone, a sloping groundwater table, aquifer boundaries such as surface water bodies, bedrock, or faults, or aquifer stresses, such as pumping.

The Hantush equation was solved using the mounding function for a circular recharge area in Aqtesolv Pro 4.0 (Hydrosolve, Inc., 2006), the equation for which follows:

$$Z(r,t) = h_m^2 - h_i^2 = (V/2\pi K)\left(w(u_0) + \left(1 - e^{(-u_0)}\right)/u_0\right)$$

where,

$Z(r,t)$ = Height of the mound above initial height of water table with respect to distance from center of recharge area over time

h_m = Height of mound above aquifer base

h_i = Initial height of water table above aquifer base

V = Volume of recharge water expressed as $w\pi R^2$, where w is the vertical infiltration rate from a circular recharge area of radius, R

K = Horizontal hydraulic conductivity of the aquifer

$w(u)$ = Theis well function for nonleaky aquifers

u_0 = $R^2/4nt$R, where $n = Kb/Sn$ and $b = 0.5(h_i(0) + h(t)$, where S = Storativity, or specific yield of the unsaturated zone, t = time since start of recharge, and b = constant of linearization

The decay of the recharge mound can also be estimated in Aqtesolv Pro using the law of superposition: $h_m^2 - h_i^2 = Z(r,t) - Z(r,t - t_o)$, where t_o is the time elapsed since recharge stops. Recharge mound contours generated by Aqtesolv Pro were exported as shapefiles and projected in the project GIS.

As shown in the Hantush equation, the development of the recharge mound is largely dependent on the vertical infiltration rate (w), storativity (S) of the unsaturated zone, and the horizontal hydraulic conductivity (K_H) and thickness of the saturated zone. Based on pumping test data, a K_H of 200 feet/day, and S of 0.10 and a conservative K_V of 2 feet/day were applied in the Hantush equation and analyzed for a continuous recharge of six months.

Based on these site-specific input data and the current recycled water production rate of 2.15 AF/day, the calculated maximum height of the recharge mound is estimated to be 2.9 feet at Site 1 and 1.7 feet at Sites 2 and 3 after six months of recharge. At Site 1 the mound dissipates to 0.5 feet high within 4,700 feet of the infiltration basin, while at Sites 2 and 3 the mound is 0.5 feet high at 3,200 feet from the respective infiltration basins. Calculated groundwater recharge mound contours are presented for each of the three sites in Figure 14. The recharge mounds shown on Figure 14 were calculated for recharge basins with approximately 1 acre of infiltration area. However, these recharge mounds would also be representative for appropriately designed vadose zone wells.

For the full build-out recycled water production rate of 4.82 AF/day and recharge basins with approximately 2.5 acres of infiltration area, the calculated maximum height of the recharge mound is estimated to be 6.0 feet at Site 1 and 3.3 feet at Sites 2 and 3 after six months of recharge. At Site 1 the mound dissipates to 0.5 feet high within 8,400 feet (1.6 miles) of the basin, while at Sites 2 and 3 the mound is 0.5 feet high at 7,400 feet (1.4 miles) from the infiltration basin.

The Hantush equation method used to estimate groundwater mounding in response to recharge does not account for changes in the geometry of the mound as a result of boundary effects from faults, surface water bodies, or bedrock. However, it appears that the relative size of the mounds at the sites evaluated is small enough that recharge could be accommodated at any of the three locations evaluated above. Further, a larger amount of recycled water could also be accommodated for recharge if additional water is available in the future.

3.3. Regulatory Requirements

The California Department of Public Health (DPH), formerly referred to as the Department of Health Services (DHS), has developed draft regulations for the use of recycled water for groundwater recharge (DPH, 2007). Draft regulations are provided in Title 22, California Code of Regulations, Division 4 Environmental Health, Chapter 3, Recycling Criteria, Articles 1-7, Sections 60301-60323, and endnotes. These regulations provide guidance for siting, operating, and monitoring a recharge project using recycled water. Application of key regulations to the District's proposed recharge project is summarized below. This discussion is not a comprehensive review of all regulations, but rather identifies preliminary requirements that could impact how the project is implemented.

3.3.1. Distance from Extraction Wells

To ensure the control of potential pathogenic microorganisms, regulations require a specific residence time in the aquifer prior to the extraction of recharged water. Required residence times are six months for a surface recharge project (i.e., spreading basin) and twelve months for a direct injection project (i.e., injection wells). To accomplish this residence time, DPH has considered vadose zone transport and conservative groundwater flow rates to establish a minimum distance between recharge and any drinking water well. Current required distances are 500 feet and 2,000 feet for surface recharge and direct injection, respectively (DPH, 2007). This requirement has been recently reviewed by DPH and will likely be modified to a required distance of 500 feet from a drinking water well for both surface recharge and injection. Although there is no documented current extraction of groundwater for municipal supply in the Bedford Subbasin, there may be active domestic wells with undocumented extractions as indicated by DWR driller's logs and communications with the District. Riverside County requires well permits for domestic wells and maintains records on those wells. However, due to limited resources, data have not been organized and are not accessible at this time. If the project moves forward, a canvas of active domestic wells will be required within 500 feet and possibly up to 2,000 feet of the selected recharge area.

3.3.2. Diluent Water

As a redundant safety measure for public protection, DPH requires that recycled water recharge projects secure an alternative water source to mix with recycled water for dilution of any undocumented occurrence of constituents of concern. This additional water source, referred to in the regulations as diluent water, must also meet all water quality requirements stipulated for recycled recharge water and must be capable of being monitored to demonstrate water quality. The mix of diluent water and recycled water varies depending, in part, on the recharge method. For example, recycled water can account for up to 50 percent of the total recharge water for injection wells but only 20 percent of the total recharge water for surface recharge. This difference reflects the assumed higher level of recycled water treatment for an injection project. If recycled water quality meets regulatory objectives, the same proportion of recycled water can be used for either surface recharge or injection.

The diluent water does not have to be mixed with the recycled water prior to recharge and can be accounted for on a three or five-year average, depending on project operation. Diluent water sources can include stormwater (if collected for recharge and monitored), groundwater, or other surface water source. Recharge of diluent water does not have to be accomplished at the same recharge site, but must be shown to mix with recycled water in the aquifer prior to reaching extraction wells. Diluent water requirements can be reduced or eliminated after a period of monitoring has demonstrated the performance of the project. A meeting with DPH regulators will assist with the determination of diluent water requirements for the District's recharge project.

3.3.3. Water Quality Requirements

The recharge water must meet numerous numerical and qualitative water quality objectives to be approved for recharge into a groundwater basin that has been designated a source of drinking water supply. At a minimum, the recharge water must be treated to meet the definition of *disinfected tertiary recycled water*, as defined in Sections 60301.23.

In general, recharge water must meet Title 22 drinking water standards and other requirements for unregulated compounds. Most of the required levels are provided in regulatory tables in Title 22, Chapter 15 including Tables 64431-A (inorganic chemicals), Table 64442/64443 (radionuclides) and Table 64444-A (organic chemicals) (DPH, 2008). Action levels (AL) for lead (0.015 mg/L) and copper (1.3 mg/L) and secondary maximum contaminant levels (MCLs) for certain constituents and characteristics must also be met. Specific requirements for nitrogen compounds vary depending on the location of compliance monitoring. If levels in the recharge water average 5 mg/L with a maximum of 10 mg/L, then concentrations are considered sufficiently low to protect water quality without additional mixing with diluent water or sampling in the vadose zone.

Recycled water data were provided by the District for a preliminary review of water quality as described previously and presented on Table 3-1. A preliminary review of available data does not indicate non-compliance with recharge regulations. For several constituents, including TDS and total hardness, recycled water quality is better quality than ambient groundwater. For constituents listed on Table 3-1 that have not yet been analyzed, additional laboratory analyses will be required to ensure sufficient water quality for recharge. In addition, regulatory agencies may identify additional water quality constituents that will be considered in a recharge permit, including unregulated compounds.

3.3.4. Monitoring

Compliance monitoring consists of analyses of recharge water, water in the vadose zone or groundwater mound, and/or downgradient groundwater, depending on the constituent being analyzed and the quality of the source water. For example, if certain stringent requirements can be met in the source water prior to recharge, the need to monitor water quality in the vadose zone can be eliminated. In general, upgradient and downgradient monitoring wells will be required to demonstrate the performance of the project.

3.3.5. Other Requirements

There are a number of other requirements that the wastewater management agency (i.e., the District) must meet for a groundwater recharge reuse project including a pollutant source control program, identification of alternative water supplies, a public notification program, and compliance with the details in a project-specific permit. The District should involve early communication with regulators to ensure that the application of regulations to the District's project is well understood.

4. Benefits for Groundwater Management

In order to manage the shared groundwater resource of the Bedford Subbasin and provide for planned growth associated with build out, management strategies will be required. The District is cooperating with neighboring agencies including the City of Corona and EVMWD in management of the Bedford Subbasin. Recharge of recycled water appears to be a viable strategy to increase subbasin yield without adverse impacts to groundwater quality.

4.1. Subbasin Yield

In the current draft of the City of Corona's GWMP, the City plans to increase production immediately downgradient of the Bedford Subbasin. The District also has the option to use additional groundwater for augmentation of water supplies through existing or new Bedford Subbasin wells. The nearby Coldwater and Temescal subbasins have experienced declining water levels. Enhanced recharge through the District's proposed project could raise groundwater levels and provide additional yield for increased groundwater extraction. As shown on Figure 10, the addition of 400 AFY to basin resources is not insignificant given historical levels of subbasin production. This amount represents about 15 percent of the average groundwater production total in the subbasin over time. If additional recycled water is available in the future, basin pumping above historical levels may be supported.

4.2. Groundwater Quality

Because the source of the recycled water contains significantly less dissolved minerals than ambient groundwater, the quality of the recycled water has the potential to improve local groundwater quality for certain constituents. As previously mentioned, TDS and total hardness are lower in recycled water. Mixing in the aquifer would dilute recycled water with groundwater and potential long-term benefits would require additional analysis. Also, additional water quality analyses are required for a full evaluation of impacts to groundwater quality. Nonetheless, based on existing data, the District's recharge project is not expected to adversely impact groundwater quality and could improve local quality in some areas.

4.3. Surface Water

Removing the current discharge of recycled water from Temescal Wash will reduce surface water flows in the short term. However, most of the discharge occurs during the wet season when runoff contributes significantly to flows and additional flows are not likely needed to support beneficial uses. By allowing the recycled water to migrate in the subsurface toward surface water discharge at the subbasin boundary, more surface water discharge could potentially be available during dry conditions.

In addition, several of the constituents in recycled water including selenium have been problematic on occasion for creek discharge. Moving the recycled water to groundwater recharge would eliminate this condition. By allowing the recycled water to receive filtration benefits from aquifer materials, water quality of the recharge water would potentially improve in the subsurface and contribute higher quality water when rising to baseflow at the edge of the subbasin.

The analysis suggests that the basin could accommodate additional recharge from recycled water than amounts analyzed in this memorandum. If more recycled water is recharged than is extracted from production wells, surface water flows would be increased as groundwater rises into Temescal Canyon and exits the subbasin.

These benefits will require further analysis and will be reviewed in the environmental analysis for the City's GWMP. However, at a minimum, no adverse impacts to surface water are expected.

5. Conclusions and Recommendations

Based on the Feasibility Study presented in this document, the following conclusions can be made about the District's proposed recharge project:

- Bedford Subbasin hydrogeology is complicated by complex geology with relatively thin alluvial aquifers interrupted by bedrock outcrops.
- Alluvial aquifers are sufficiently thick in some areas to support an enhanced recharge project based on bedrock mapping.
- Aquifer testing in one District well indicates that subbasin aquifers have sufficient permeability and storage to support the District's project.
- Groundwater occurs at depths ranging from 100 feet to about 10 feet across the subbasin and is deepest in the west and shallowest near Temescal Wash.
- Groundwater is sufficiently deep in several areas to provide available storage for the District's recharge project.
- Groundwater quality data are limited, but one analysis indicates very hard water (total hardness of 370 mg/L) with a relatively high mineral content (TDS of 690 mg/L).
- Assuming a conservative infiltration rate of 2 ft/day, WRF recharge would require a minimum infiltration area of 1 acre for the current maximum discharge and 2.5 acres for full build-out.
- An analysis of groundwater mounding indicates that the anticipated water level rise in the vicinity of the proposed recharge sites is estimated to be between 1.7 and 2.9 feet (dependant on the location) for the current maximum WRF output of 2.15 AF/day. It appears that there is adequate unsaturated area in the proposed recharge locations to accommodate this quantity of groundwater.
- Further analysis of groundwater mounding for the increased capacity at full build-out (4.82 AF/day) indicates that the water level rise in the vicinity of the proposed recharge sites is estimated to be between 3.3 and 6.0 feet (dependant on the location). It appears that there is adequate unsaturated area in the proposed recharge locations to accommodate this quantity of groundwater.
- A comparison of recycled water quality data with regulatory requirements did not identify any significant water quality issues for the District's project. Additional water quality analyses will be required to demonstrate regulatory compliance if the project is implemented.

- The District's project provides management benefits to subbasin yield and, potentially, groundwater and surface water quality.
- Based on the results in this study, the District's proposed recharge project appears feasible and could involve a variety of recharge methods, depending on final project location.
- The analysis was based on limited data and significant data gaps exist. Recommendations to address these data gaps are provided below.

For continued assessment and implementation of the District's project, the following recommendations are provided:

- Include the recycled recharge project in the City of Corona's GWMP and support GWMP adoption.
- Participate in the environmental review process planned for the City's GWMP.
- Explore options for securing land in the areas designated most favorable for recharge and consider additional infrastructure required for conveyance of recycled water.
- Conduct an exploratory meeting with regulatory agencies regarding project objectives and permit requirements.
- Conduct site-specific evaluations and investigations to determine potential injection rates and aquifer response to recharge.
- Continue and expand recycled water quality testing to include constituents identified on Table 3-1 as well as additional constituents indicated by regulators in preliminary meetings.

6. References

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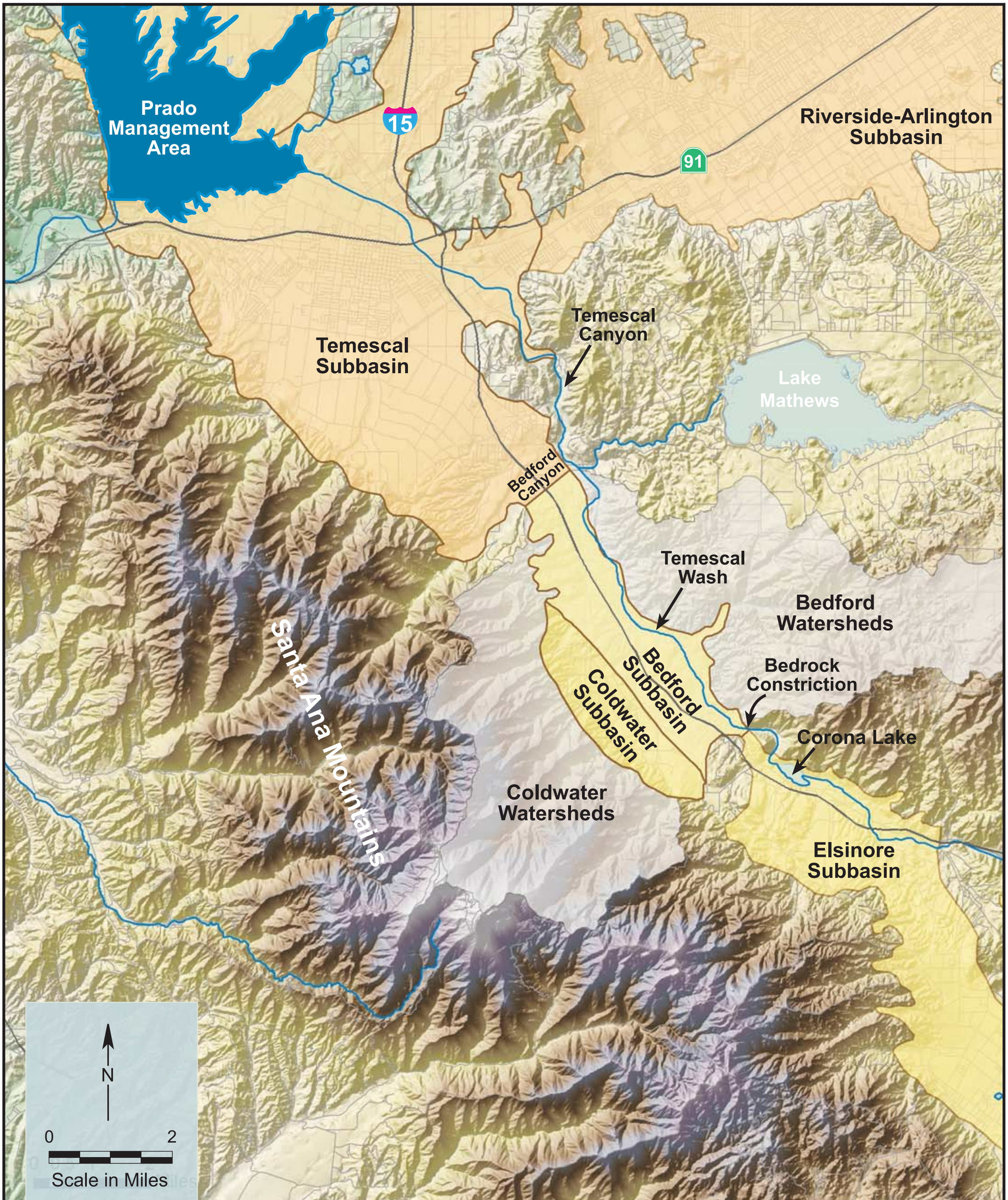
Figures



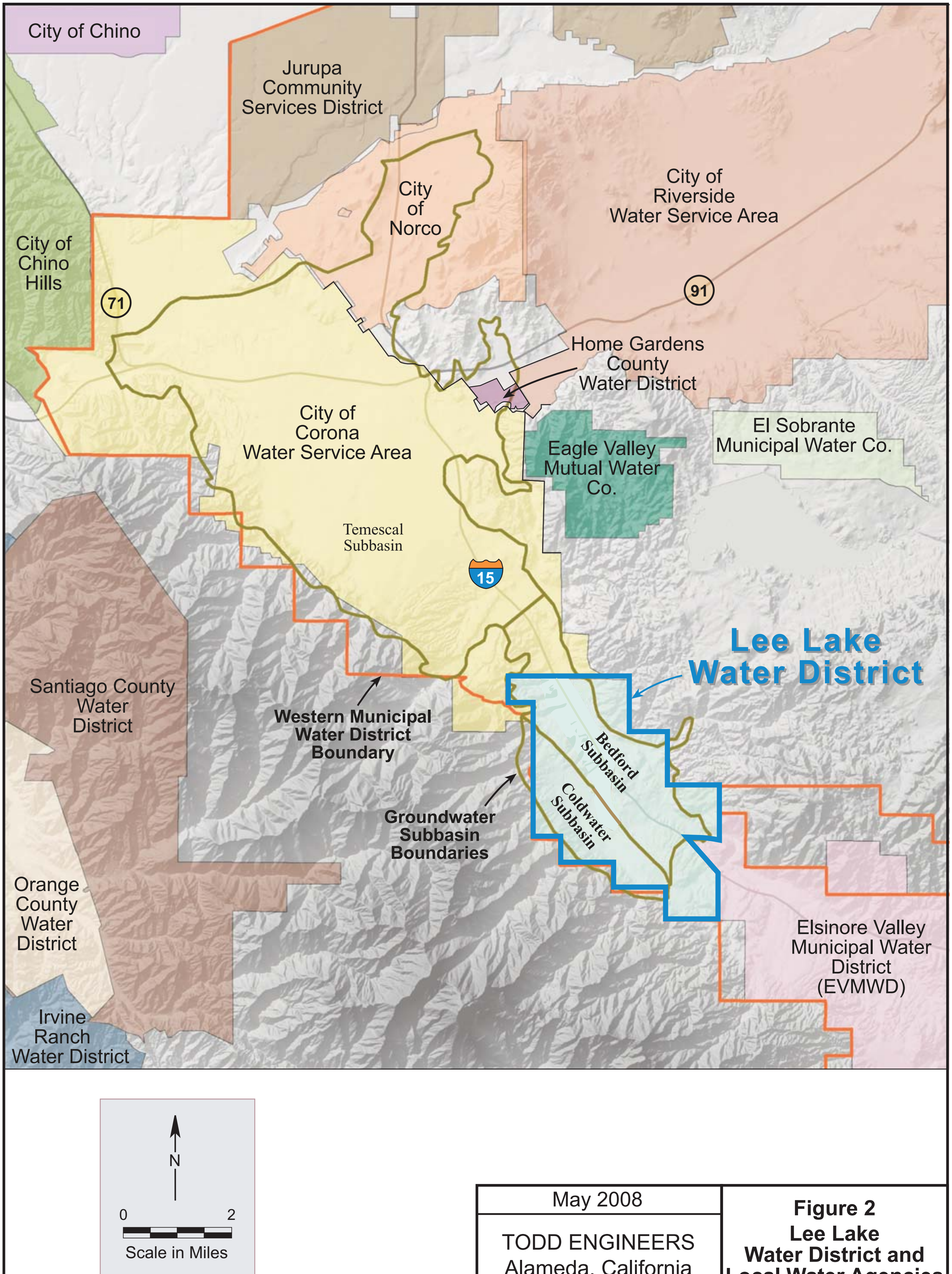
LEGEND

- Upper Santa Ana Valley Groundwater Basin
- Elsinore Groundwater Basin

May 2008

TODD ENGINEERS
Alameda, California

Figure 1
Groundwater Basins and Study Area

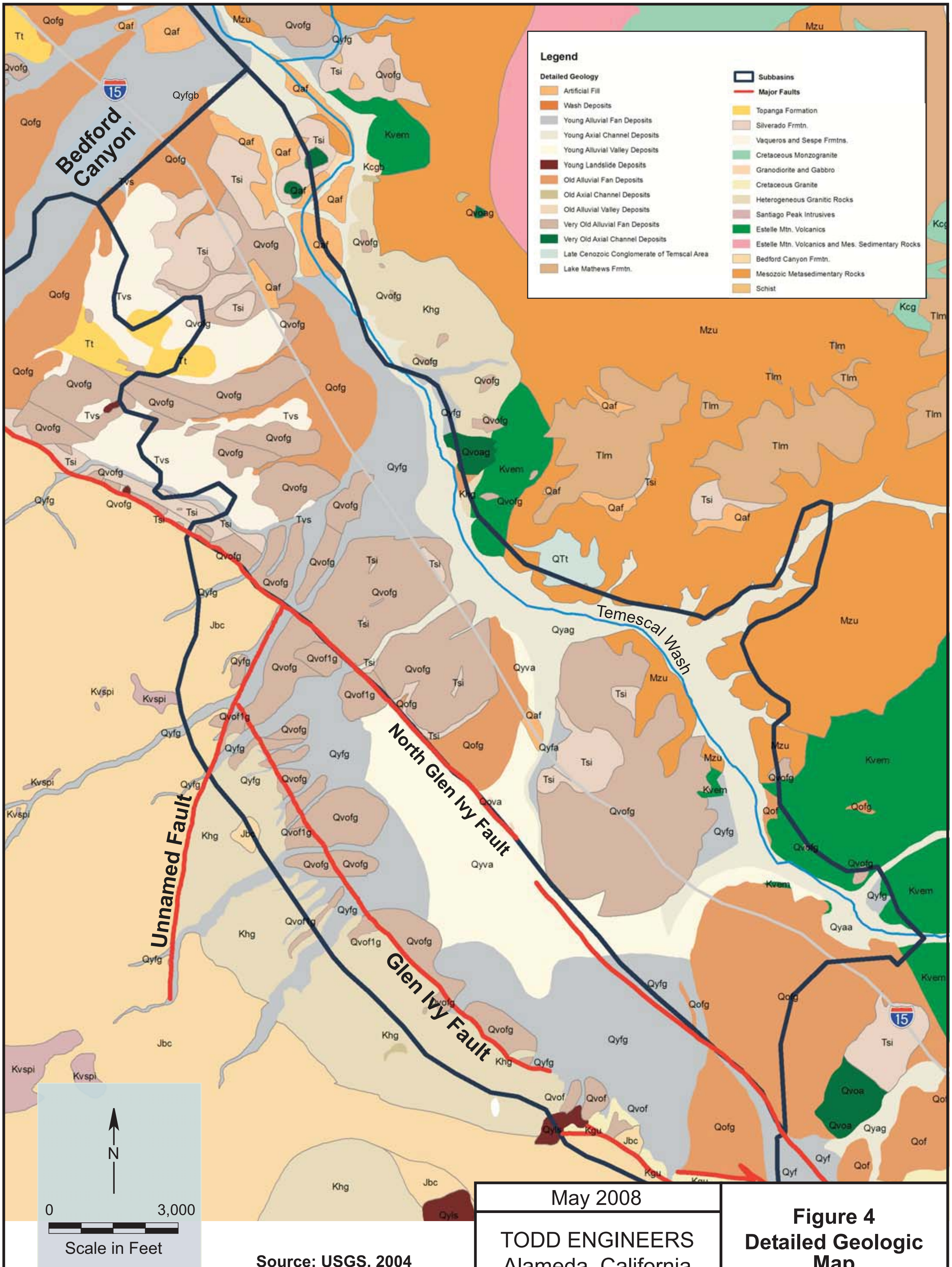


May 2008	**Figure 2**
TODD ENGINEERS Alameda, California	**Lee Lake Water District and Local Water Agencies**

May 2008

TODD ENGINEERS
Alameda, California

Figure 3
Aerial Photograph
Bedford Subbasin

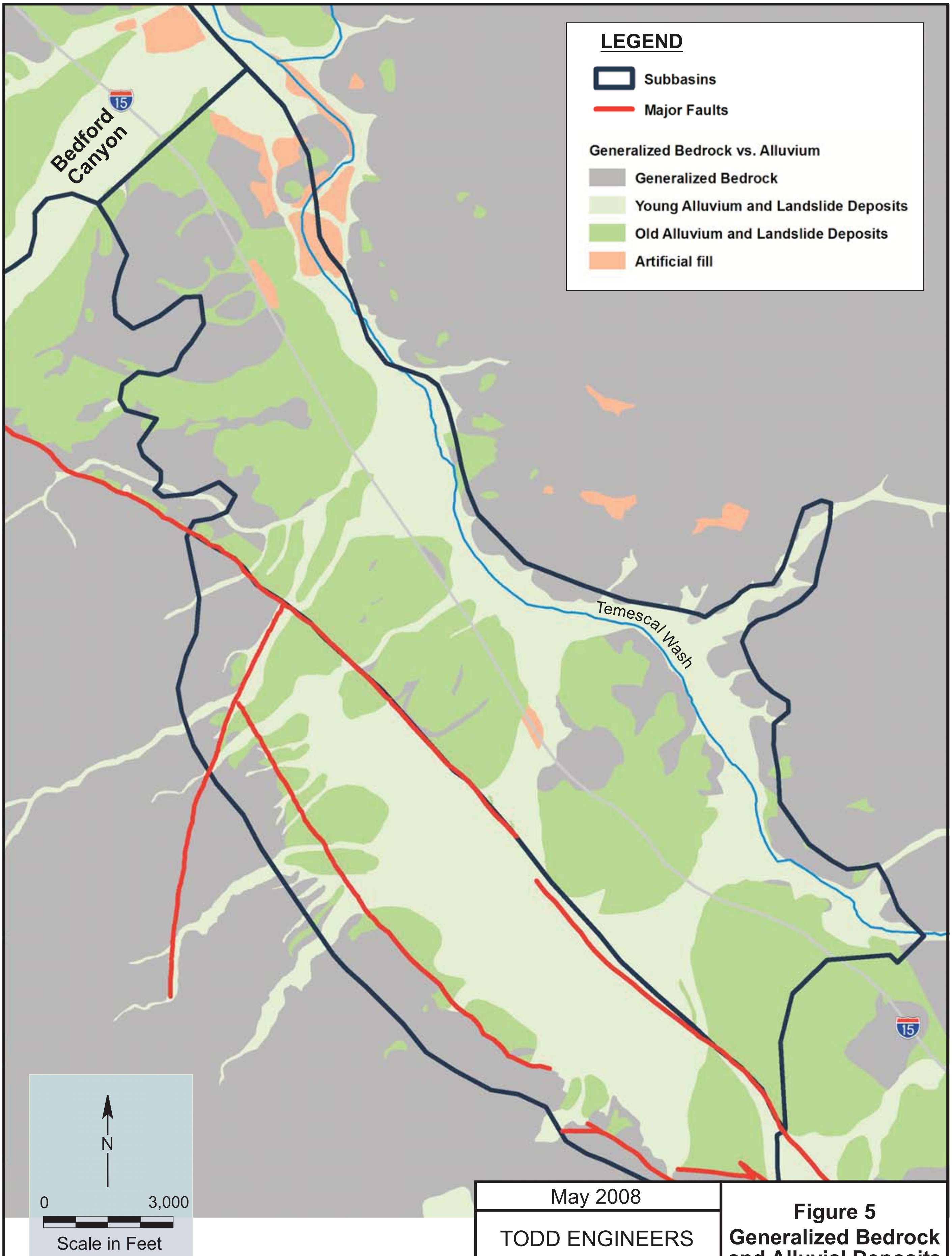


Source: USGS, 2004

May 2008

TODD ENGINEERS
Alameda, California

Figure 4
Detailed Geologic Map



May 2008

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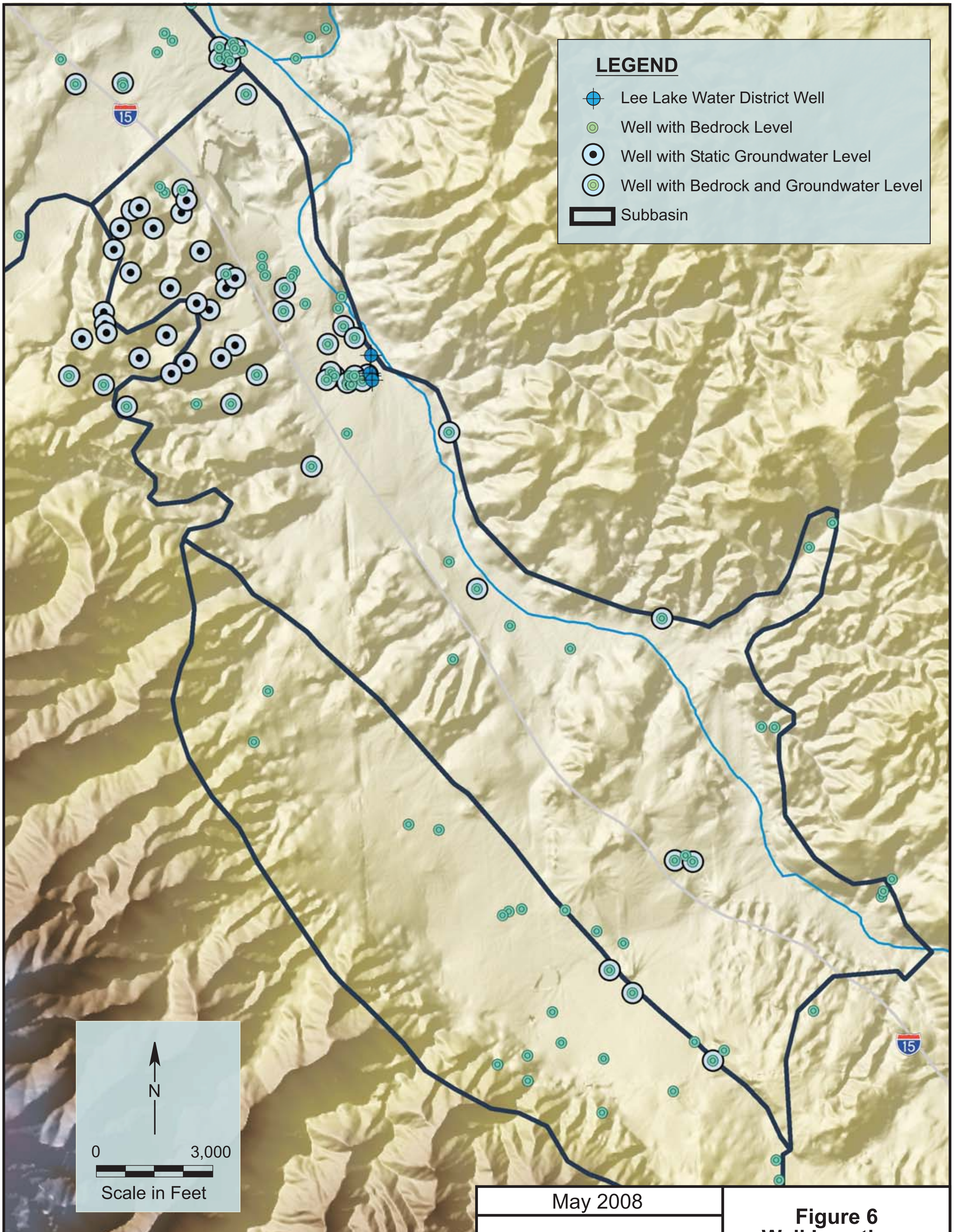
Figure 5
Generalized Bedrock and Alluvial Deposits



Well Locations approximated from DWR Driller's logs.
Lee Lake Water District well locations provided by District.

May 2008

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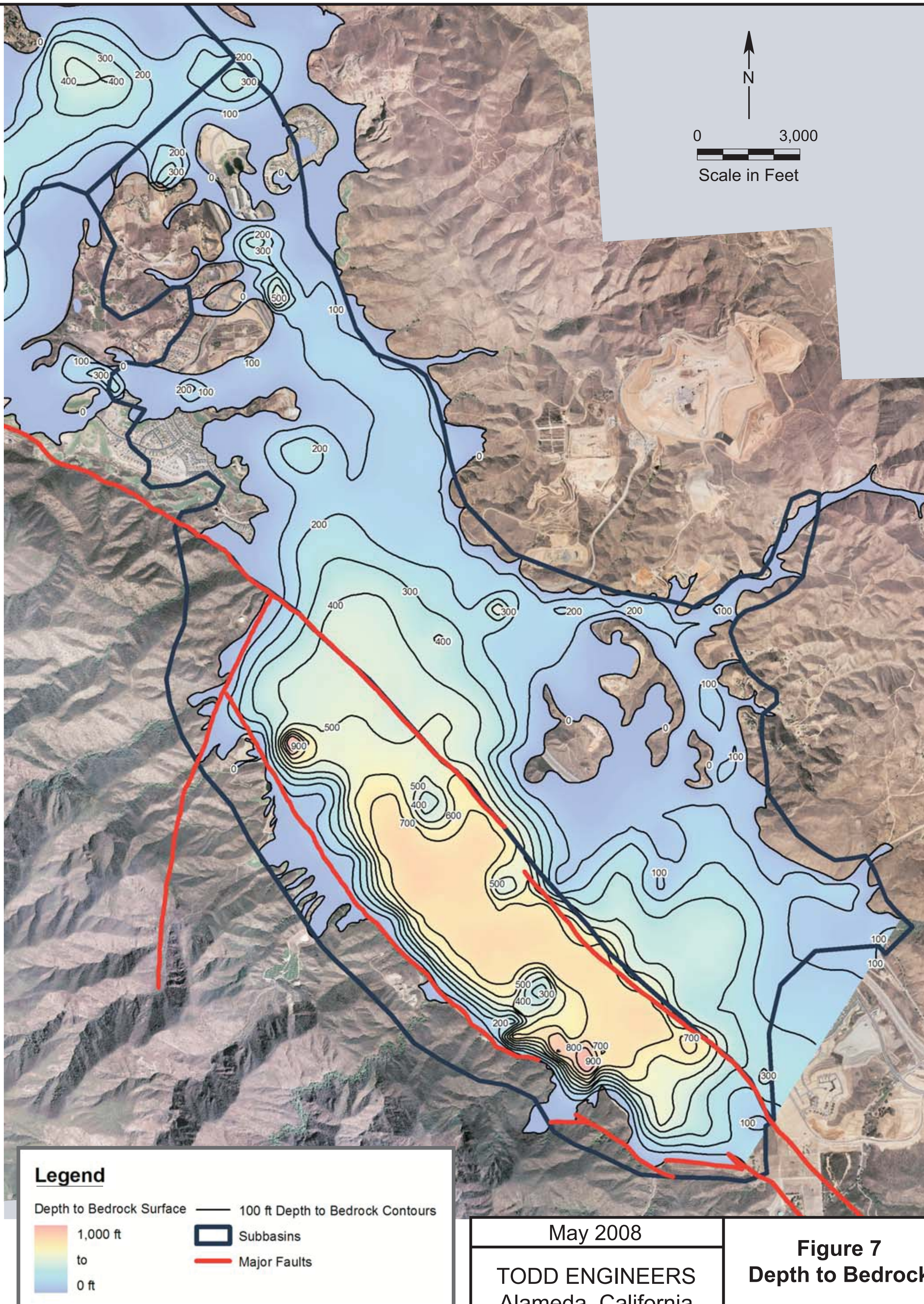
Alameda, California

Figure 6
Well Locations



May 2008

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Figure 7
Depth to Bedrock

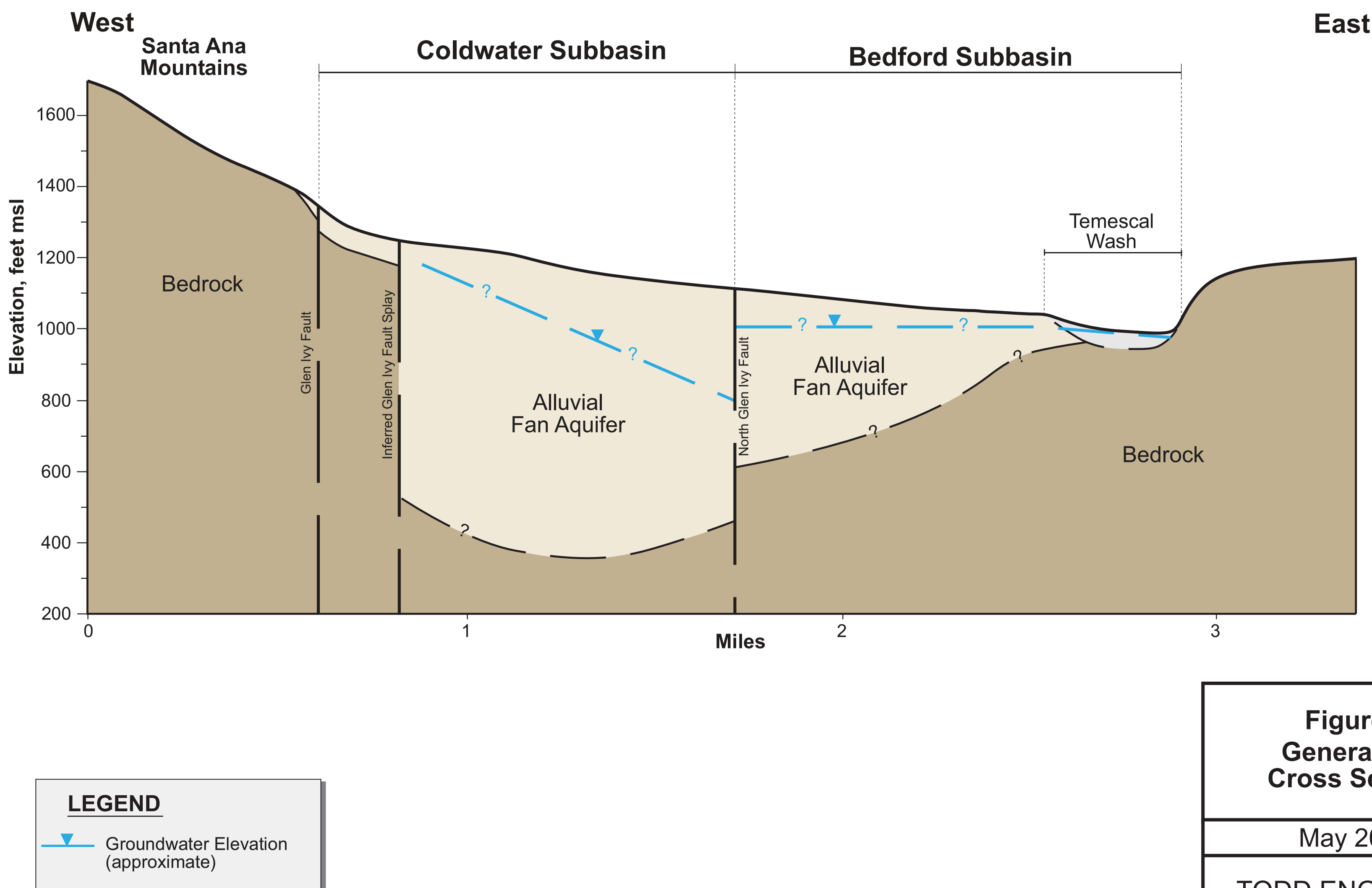

Figure 8
Generalized Cross Section

May 2008

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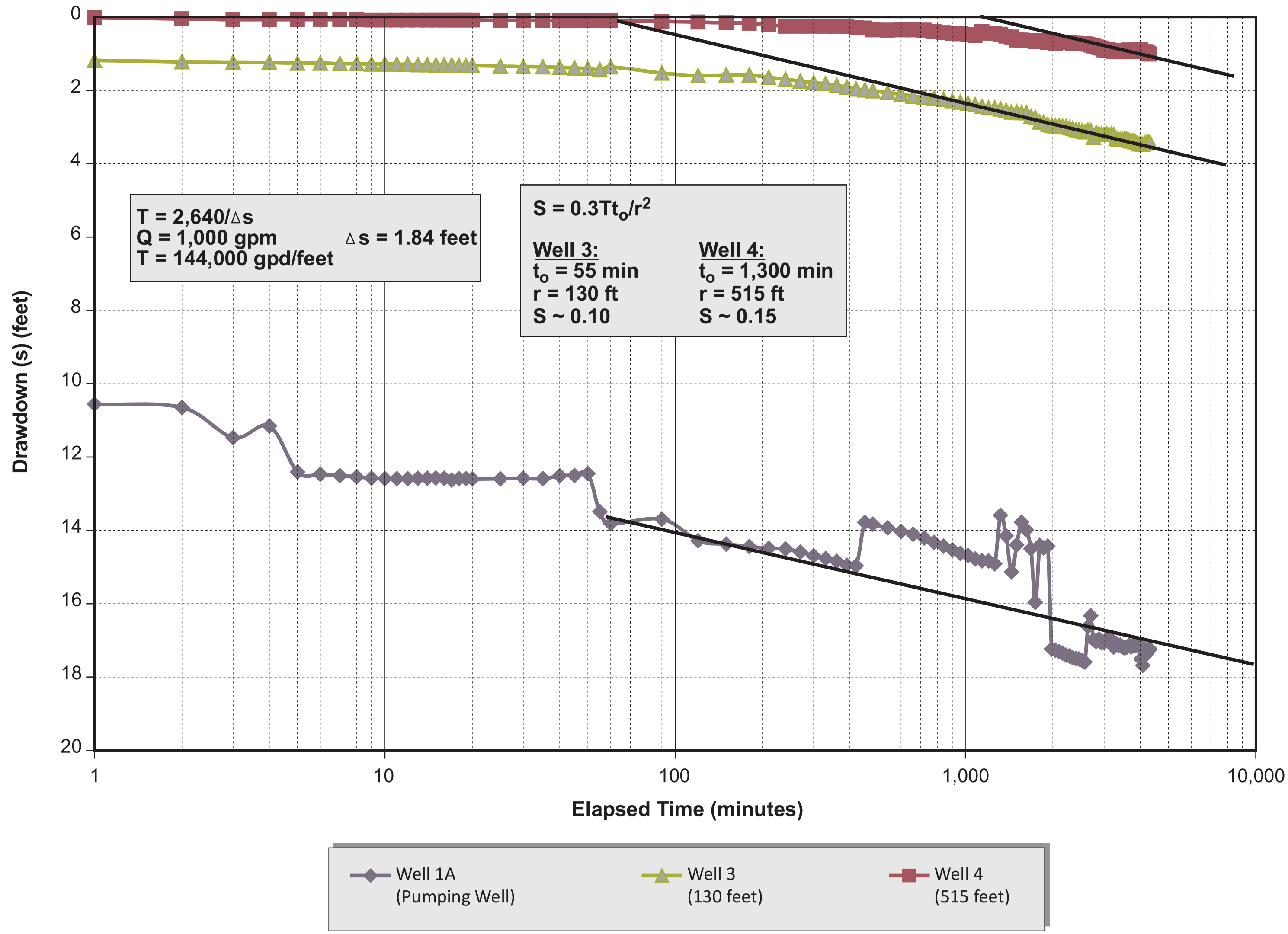
Alameda, California



May 2008

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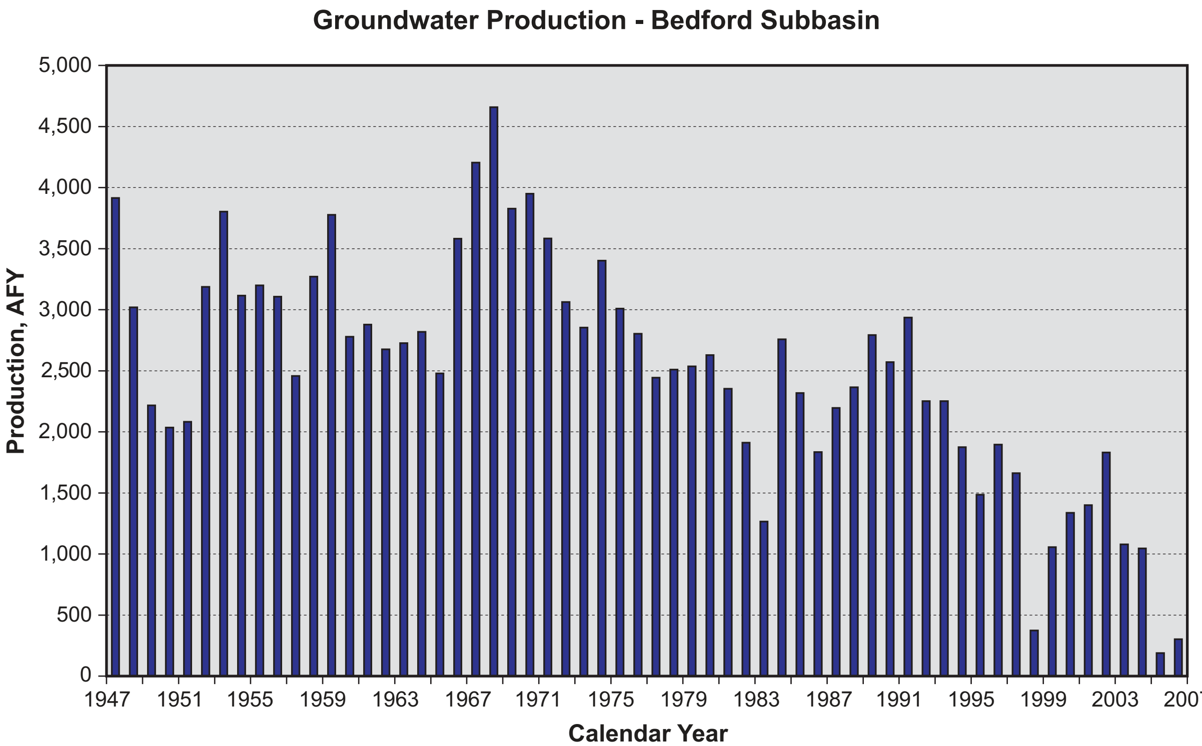
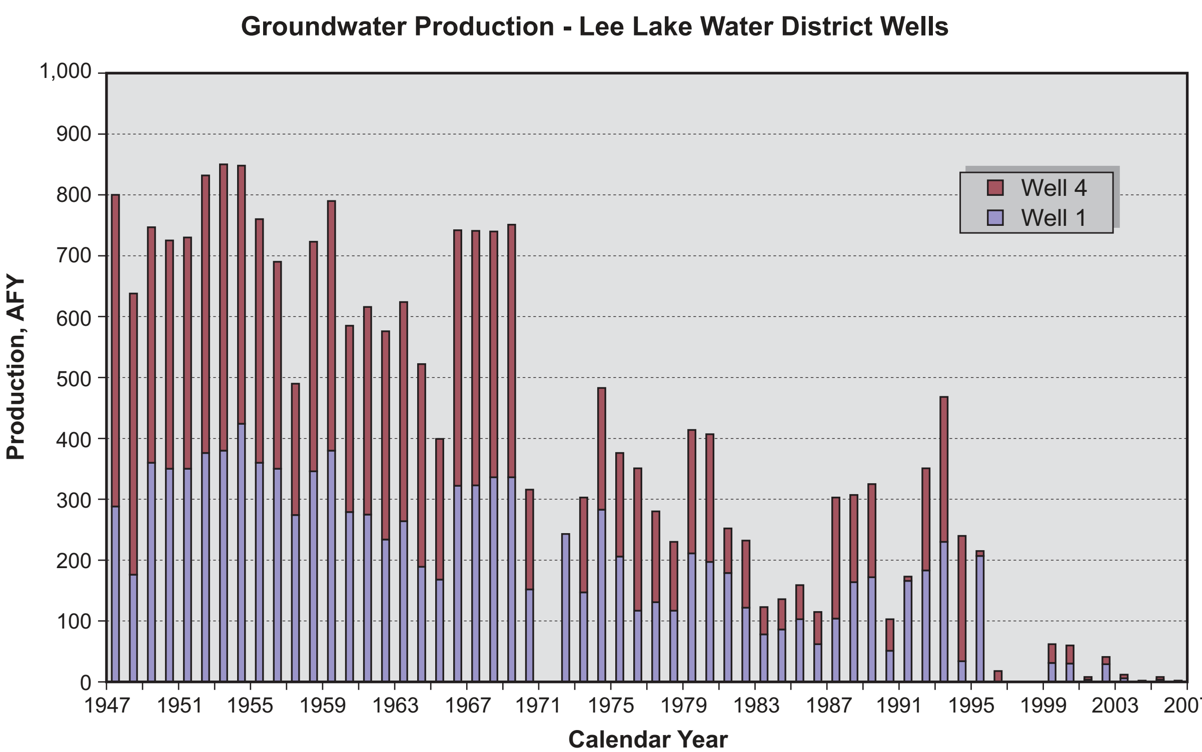
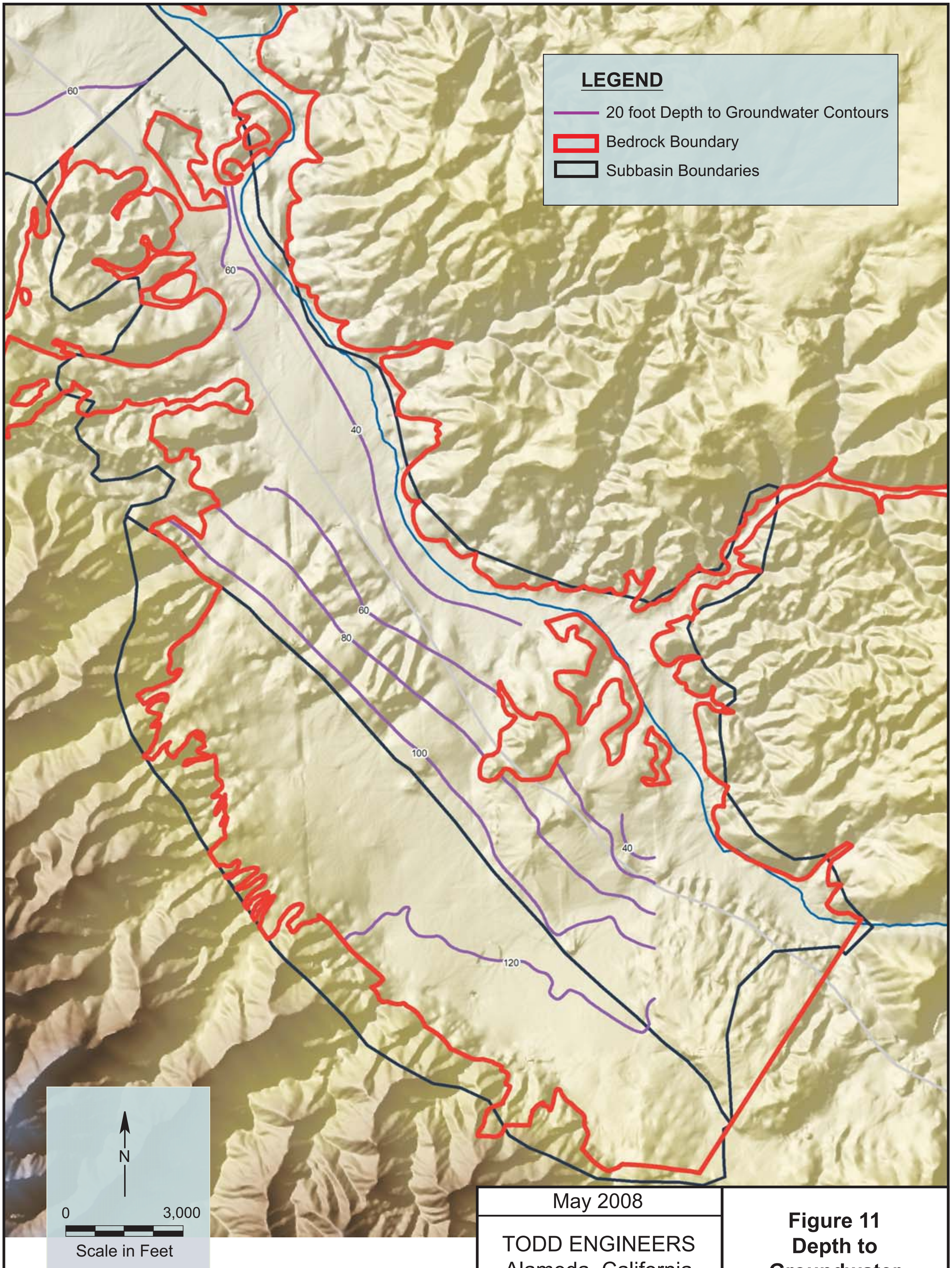
Alameda, California

Figure 9
Pumping Test Analysis Well 1A
February 2003





May 2008	**Figure 10**
TODD ENGINEERS Alameda, California	**Bedford Subbasin Groundwater Production**



May 2008

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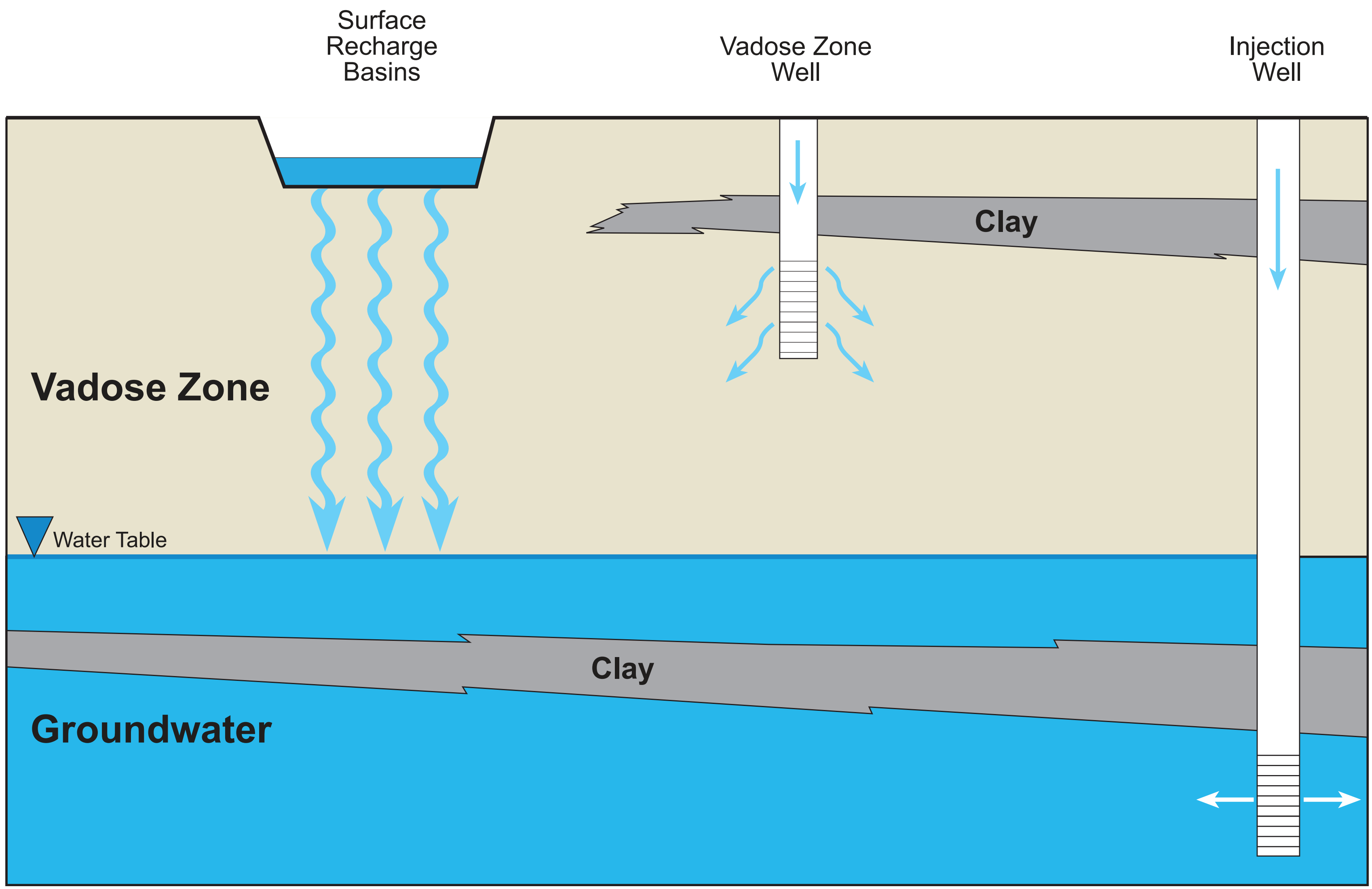
Alameda, California

Figure 11
Depth to Groundwater



May 2008	**Figure 12**
TODD ENGINEERS Alameda, California	**Recharge Methods Schematic Diagram**

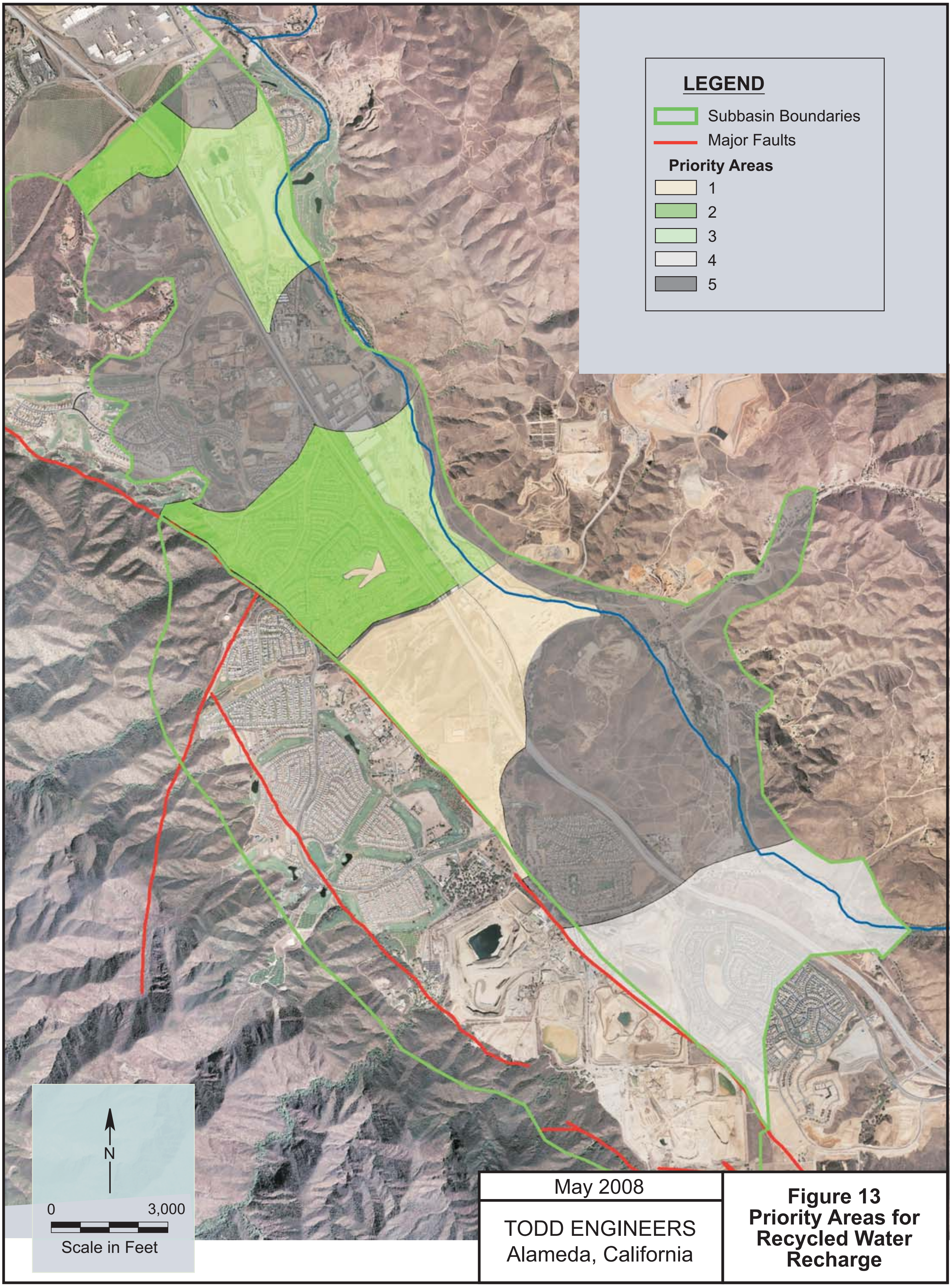
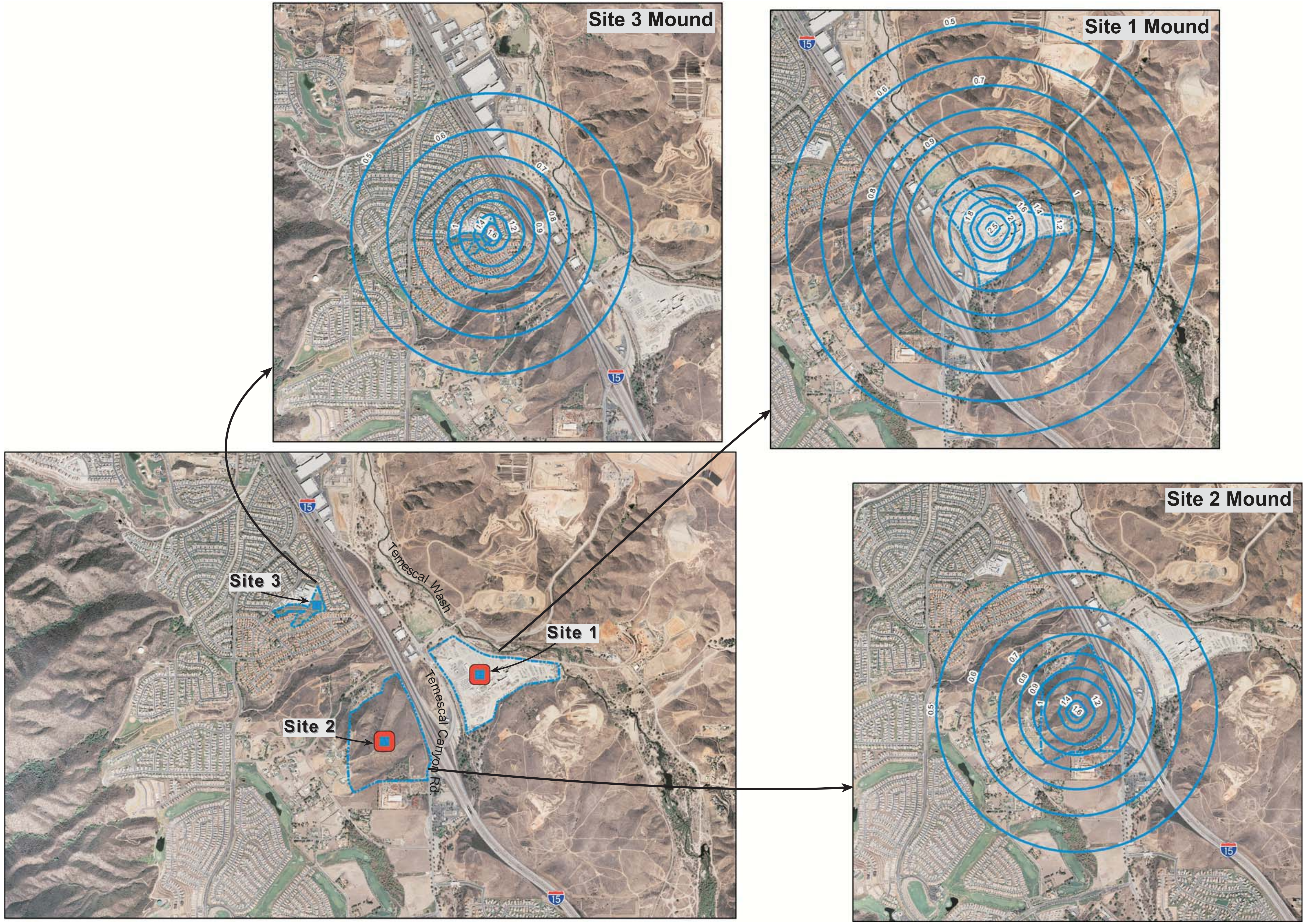


Figure 13
Priority Areas for Recycled Water Recharge



May 2008	Figure 14 Potential Recharge Areas and Approximate Recharge Mounds After Six Months
TODD ENGINEERS Alameda, California	

Appendix H

Coldwater Basin Agreement

Department of Water and Power

MEMORANDUM

DATE: May 4, 2009

TO: Karly Gaynor, Business Supervisor

FROM: Michelle Tveito, Assistant to the General Manager

SUBJECT: Fully executed agreement for file

Please find the attached "Agreement concerning Water Production from the Coldwater Basin" with the EVMWD dated April 21, 2009 for your records.

AGREEMENT CONCERNING WATER PRODUCTION FROM THE COLDWATER BASIN

THIS AGREEMENT, effective this 1st day of December, 2008, is made and entered into by and between the CITY OF CORONA, a municipal corporation ("City") and the ELSINORE VALLEY MUNICIPAL WATER DISTRICT, a municipal water district ("District"). The City and the District are sometimes collectively referred to herein as the "Parties."

RECITALS

A. The City and the District both own and operate water production facilities in the Coldwater Basin in Temescal Canyon of Riverside County. The agreed-upon boundaries of the Coldwater Basin are depicted on the map attached hereto as Exhibit "A" and made a part hereof.

B. Pursuant to that certain "Agreement of Sale of Certain Assets of the Corona City Water Company and the Temescal Water Company to the City of Corona" dated December 27, 1963 (hereafter referred to as the "1963 Agreement"), the Parties (or their predecessors) agreed to restrict a portion of the Coldwater Basin from which the District may produce water.

C. The District constructed a well ("the Trilogy Well") in order to replace production lost when its Well 72 went out of production due to the expansion of Cemex, Inc. Sand and Gravel Mining Activities. The location of the Trilogy Well is not in accord with the terms of the 1963 Agreement.

D. By this Agreement, the Parties (i) intend to supersede all prior agreements dealing with the subject matter hereof, including the 1963 Agreement and that certain January 6, 1999 "Agreement for the Sale or Exchange of Water Between the City of Corona and Elsinore Valley Municipal Water District" (the "1999 Agreement"), (ii) intend to provide for the joint use of the Trilogy Well, and (iii) intend to establish a process and develop projects which will enhance the available supply of groundwater in the Coldwater Basin, and to maximize the sustainable use thereof.

AGREEMENT

NOW, THEREFORE, the Parties agree as follows:

1. **Operating Committee.** Within 30 days of the effective date hereof, the City Manager of the City and the General Manager of the District shall each appoint a representative to a Committee ("the Operating Committee") which will make operational decisions in order to implement the terms and provisions of this Agreement. Any such appointee may be replaced through the same appointment process, and any vacancy in an Operating Committee position shall be filled promptly by such appointment. The primary purpose of the Operating Committee is to ensure that the City and the District be allowed to pump sufficient water from the Coldwater Basin to meet their respective requirements and to maximize the sustainable use of the Basin as a water supply. A primary function of the Operating Committee will be to annually determine the amount of groundwater that can be safely extracted from the Coldwater Basin (the "Allowable Production").

2. **Determining Allowable Production.** The Allowable Production by the Parties shall be determined by the Operating Committee as follows:

a. The accounting year shall be July 1 to June 30. The accounting commencement date shall be July 1, 2008. Thereafter, the Allowable Production shall be determined by May 1 of each year.

b. The Allowable Production will be determined in light of the best information available to the Operating Committee. It shall be the goal of the Operating Committee to estimate an amount of Production that (i) ensures the sustainability of the Basin as a water supply and (ii) allows the Parties to flexibly adjust the Allowable Production in response to extreme hydrologic conditions and/or the short term operational needs of each of the Parties.

c. The amount of the annual Allowable Production shall be allocated to each Party annually by the Operating Committee, and will be equal to their respective share in the total of: Native Safe Yield **plus** return flows and water imported to the Basin by either or both Parties during the preceding fiscal year:

i. The initial Native Safe Yield shall be 3,300 acre feet per year for each of the first five fiscal years following the effective date of this Agreement. Thereafter, the Operating Committee shall re-determine the Native Safe Yield every five years;

ii. The initial shares in the total of Native Safe Yield, return flows and water imported to the Basin shall be as follows:

To the City:	64%
To the District:	32%

The remaining 4% shall be allocated in the aggregate to the private well producers in the Coldwater Basin. The two-thirds/one-third proportion shall also be used to allocate the costs and expenses incurred in connection with the study and implementation of capital projects jointly undertaken by the Parties in each of the first five years following the effective date of this Agreement.

d. The Operating Committee shall review, every five years following the effective date of this Agreement, the annual production records of all producers in the Coldwater Basin to determine the actual amount of groundwater production by each producer. At the conclusion of such review, the respective shares of the Parties in Native Safe Yield for the following five years shall be adjusted on a pro-rata basis. For example, if the actual production of the overlying producers is 2% and not 4%, then the City shall be entitled to 63.2917% of the difference and the District shall be entitled to 34.7083%.

3. **Storage Rights.** The City and the District shall have the right to store un-produced Allowable Production up to ten times their initial share in the Native Safe Yield multiplied by the initial Native Safe Yield of 3,300 acre feet per year, in a Storage Account; provided, however, that the maximum amount of groundwater storage shall be:

a. For the City: 21,120 acre feet;

b. For the District: 10,560 acre feet.

4. Annual Production Right. The "Annual Production Right" of a Party shall be equal to a Party's Annual Allowable Production **plus** some or all of the water held in that Party's Storage Account as determined by that Party.

5. Joint Use of the Trilogy Well. Although the City and the District individually own and operate groundwater production wells in the Coldwater Basin, they mutually acknowledge and agree that joint operation of the District's Trilogy Well is desirable because it is capable of producing large amounts of water cost-effectively. Under the supervision of the Operating Committee, which shall review the specifications and bids thereon, the District shall complete construction of the Well and the pipelines connecting the Well to the City's and the District's water distribution systems. Thereafter, the District shall operate and maintain the Well and deliver therefrom, to the District and to the City, such amounts of water as may be ordered by them through the Operating Committee.

6. Water Rate. The cost of water produced from the Trilogy Well shall consist of Fixed Costs and Variable Costs:

a. Fixed Costs consist of 20 annual replacement cost payments of approximately $60,000.00, which is the annual payment amortized at 5% over 20 years on a principal of $750,000.00. This will provide adequate funds to replace or refurbish the pumping equipment after a 20-year useful life. The District shall be obligated to pay one-third of the Fixed Costs, and the City shall be obligated to pay two-thirds of such Costs. Fixed Costs shall be paid by the District and the City whether or not the Parties purchase water produced by the Well. These funds, and all accumulated interest, shall be held in a separate interest-bearing fund specifically for future replacement or refurbishment of the Well.

b. Variable Costs consist of the actual costs and expenses incurred in operating and maintaining the Trilogy Well, and shall be paid in proportion to the amount of water purchased by a Party. The Operating Committee shall annually reconcile the Variable Costs with the amount of revenue received from the sale of water to ensure that the revenue is sufficient to defray such Costs. Any revenue shortfalls shall be pro-ratably shared by the Parties; excess revenue shall be carried over to the next year or refunded upon request.

7. Supplemental Water Projects. The District owns surface water rights licensed by the State Water Resources Control Board in Mayhew, Indian and Horsethief Creeks, which licenses authorize the diversion and storage of up to 1,887 acre feet per year. Under the supervision of the Operating Committee, the City and the District shall jointly formulate and fund plans and projects to deliver such water for storage in the Coldwater Basin, to be shared by the Parties as a component of their respective Annual Production Right.

8. **<u>Trilogy Well Operations.</u>** The District shall retain title in and to the Trilogy Well and the parcel of land upon which it is located, shall operate the Trilogy Well and, as may be necessary from time-to-time rehabilitate the Trilogy Well. All operations shall be conducted under the supervision of the Operating Committee, and the Committee shall provide a quarterly report of such operations to the Parties.

9. **<u>Access and Indemnification.</u>** The District shall provide reasonable access to the City's agents and employees to inspect operations at the Trilogy Well. The District shall indemnify the City and its elected officials, officers, agents and employees and hold each of them harmless from any damages, claims, actions, causes of action or suits, including attendant costs and attorneys' fees, which may arise out of or be in any way connected with the District's operation of the Trilogy Well except for any such damages, claims, actions, causes of action or suits alleged or found to be caused by the negligent, reckless or intentional actions of any of the City's elected officials, officers, agents or employees.

10. **<u>Insurance.</u>** The Operating Committee shall cause the operation of the Trilogy Well to be ensured in a manner and extent similar to the operation of other publicly-owned wells in the Coldwater Basin.

11. **<u>Functions of the Operating Committee.</u>** The Operating Committee shall perform the following functions concerning management of the Basin in order to sustain it as a water resource for the benefit of the Parties:

a. Annually specify the amount of the Parties' Allowable Production, Annual Production Right and water in storage in accordance with the best information available to the Committee;

b. In its discretion, retain technical consultants to assist the Committee in establishing Allowable Production and the Annual Production Right for each Party and to evaluate and resolve other groundwater management issues;

c. Review and approve new water production facilities proposed to be developed in the Coldwater Basin by either Party and any proposal to increase the capacity of any such existing facility;

d. Represent the City and the District in transactions involving other public agencies and/or private parties intended to implement projects which will increase groundwater recharge and surface retention for the Basin;

e. Provide for joint funding, in proportion to yield, for completion of the Trilogy Well and implementing groundwater recharge and surface retention of projects;

f. Develop and implement a process whereby the City will assume the responsibility for water service to the District's present Temescal non-potable water customers located within the City but outside the Coldwater Basin including the sale by District to City of certain stranded Temescal facilities; and

g. Develop and implement a process by which the Parties will employ their best efforts to negotiate the District's sale of non-potable water to the City for use in the City's Recycled Water System.

12. Integration. This Agreement shall supersede any other agreement between the Parties or any provision or provisions therein contained including, but not limited to, the 1963 Agreement, the 1999 Agreement and Amendment No. 1 thereto dated July 18, 2001, and they are hereby deemed to be null and void and rescinded in their entirety.

13. Dispute Resolution Procedures. The Parties will attempt in good faith to resolve any dispute, claim or controversy arising out of or relating to this Agreement, as follows:

Step 1: All disputes, claims or controversies shall first be considered, and resolution shall be attempted, by the Operating Committee. If the Operating Committee is deadlocked, then the matter shall be referred to an informal negotiation between the parties, Step 2.

Step 2: The Operating Committee shall initiate such negotiations by providing written notice to the Parties setting forth the subject of the dispute. The Parties, through the City Manager of the City and the General Manager of the District, shall promptly schedule a negotiation meeting to be attended by such representatives of either Party as may be reasonably necessary to address the issues presented by the Operating Committee. If the dispute is not resolved by these informal negotiations, the issue will be submitted for mediation, Step 3.

Step 3: The Parties shall submit to a mandatory mediation, which shall be conducted by a mutually agreed-upon neutral mediator. The mediator selected shall be experienced, neutral, without conflicts of interest, and qualified to mediate disputes of the nature of those that may arise under this Agreement. If the Parties are unable to agree upon a mediator, each Party shall select one mediator, with the two selected mediators selecting a third, qualified neutral mediator. The Parties covenant that they will participate in the mediation in good faith and that they will share equally in all costs of the mediation. In the event mediation fails, the Parties shall submit the issue to binding arbitration, Step 4.

Step 4: Binding arbitration shall be initiated promptly upon the failure of the mandatory mediation phase. Arbitration shall be conducted by the Judicial Arbitration and Mediation Services, Inc. ("JAMS") or its successor, or any other neutral, impartial arbitration service that the Parties mutually agree upon, in accordance with its rules in effect at the time of the commencement of the arbitration proceeding an as set forth in this Paragraph. The arbitrator chosen must decide each and every dispute in accordance with the laws of the State of California, and all other applicable laws. The arbitrator's decision is subject to judicial review by the Riverside County Superior Court for material errors of fact or law. Upon a showing of good cause the arbitrator may permit limited discovery in the arbitration proceeding.

14. Amendment. This Agreement may be amended only by agreement in writing of the Parties. No waiver of any provision of, nor any consent to any exception to the terms of this Agreement, shall be effective unless in writing and signed by the Party to be bound and then only for the specific purpose, extent and instance so provided.

15. **Notices.** Any notice or other communication hereunder must be given in writing and either: (a) delivered in person; (b) transmitted by telecopy, e-mail or other telecommunications mechanism; or (c) mailed, postage prepaid, as follows:

If to City:

Jonathan Daly, General Manager
City of Corona
Department of Water and Power
730 Corporation Way
Corona, California 92880
Telecopier: 951-735-5786
E-mail: jonathan.daly@ci.corona.ca.us

If to District:

Ronald Young, General Manager
Elsinore Valley Municipal Water District
31315 Chaney Street
Lake Elsinore, California 92531
Telecopier: 951-674-9872
E-mail: ryoung@evmwd.net

Or to any such other address or such other person as either Party shall have last designated to the other Party.

16. **Severability.** In case any one or more of the provisions of this Agreement shall for any reason be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision hereof, and the remainder of the provisions of this Agreement shall continue in full force and effect without impairment, provided that the essential provisions of this Agreement for both Parties remain valid, binding and enforceable.

17. **Assignment.** Neither Party shall transfer or assign this Agreement without the prior written consent of the other Party, which consent shall not be unreasonably withheld. This Agreement shall be binding upon and inure to the benefit of the Parties hereto and their respective successors and assigns.

18. **Further Documents.** The Parties shall execute such other and further documents and do such further acts as may be reasonably required to effectuate the intent of the Parties and carry out the terms of this Agreement.

19. **No Third Party Beneficiaries.** Nothing in this Agreement whether expressed or implied, is intended to confer any rights or remedies under or by reason of this Agreement on any persons other than the Parties to this Agreement and their respective successors and assigns.

20. **Purchase and Sale of Assets.** The District agrees to sell and the City agrees to buy the following assets (and real property interests necessary to utilize those assets), as they are depicted on Exhibit "B" attached hereto, for the sum of $2,000,000.00 or, at the City's election, the sum of $2,500,000.00 paid to the District over a period of 10 years from the Effective Date of this Agreement, in equal annual installments:

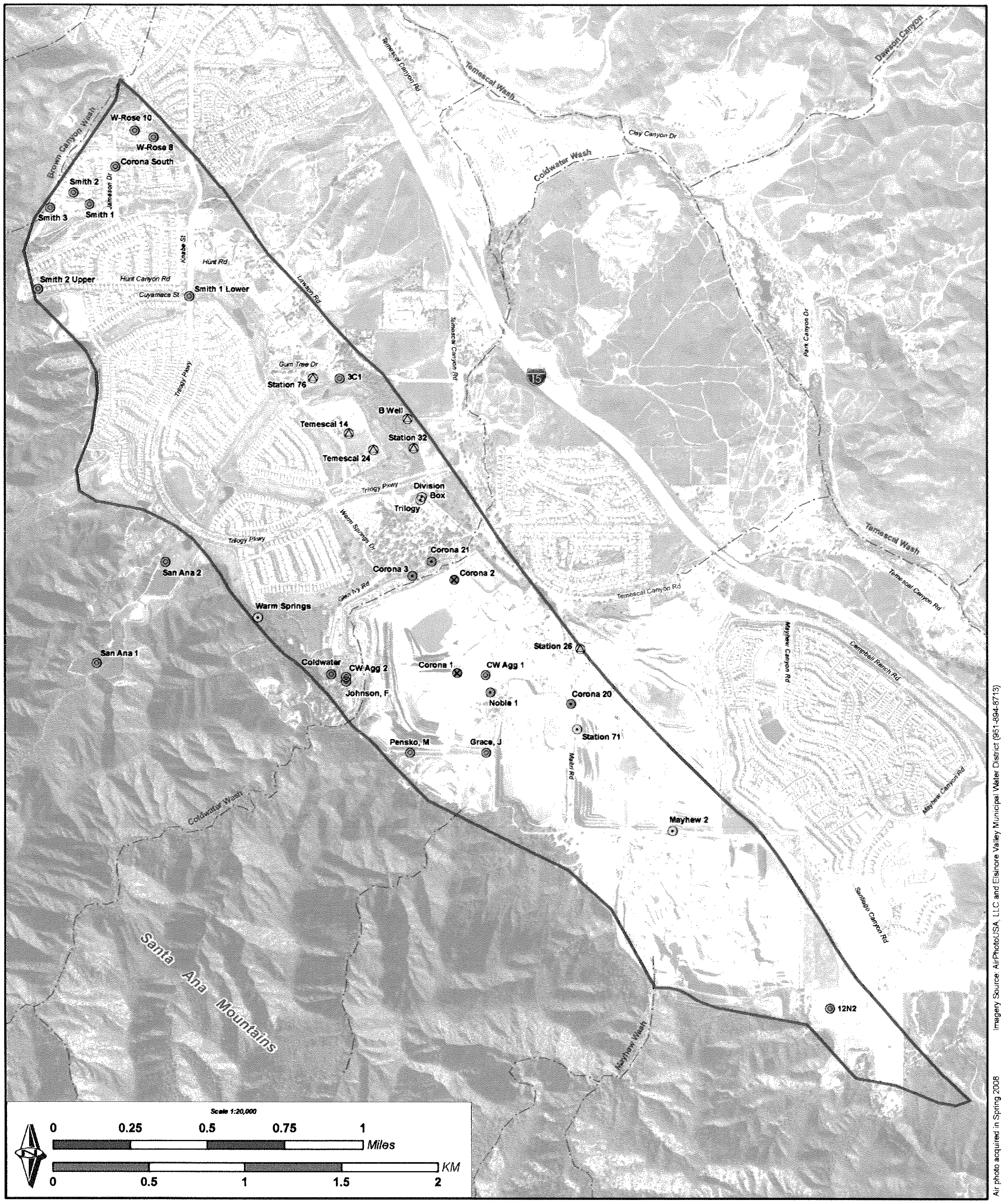
a. No. 2 Line
b. The Riverside Booster Line
c. MWD WR 19b Connection
d. Miscellaneous pipelines and service laterals.

The City acknowledges and agrees that the purchase of such assets by the City will impair the District's ability to convey water to the Santa Ana River. Therefore, as additional consideration for the purchase and sale the City hereby grants the District the irrevocable right to use the City's storm drains to convey the District's water to the Santa Ana River, provided that there is available capacity in the drains to convey stormwater.

21. <u>First Right to Purchase Temescal Valley Line.</u> The District hereby grants to the City a right of first refusal to purchase the District's interest in the Temescal Valley Line, in the event the District determines to sell the same and has received a bona fide offer from a third party. Prior to accepting such offer, the District shall submit the same to the City, and the City shall have up to 60 calendar days to precisely match or exceed such offer in a signed and binding writing as to all terms and conditions. In the event the City does not respond in writing to the District within the time allowed, the lack of such response shall be deemed a refusal to exercise the right granted herein. In addition, in the event the District is capable of delivering clear title to the Temescal Valley Line to a purchaser, the District shall give the City 60 days' notice thereof, in order to give the City an opportunity to purchase the Temescal Valley Line.

WHEREFORE, the Parties have executed this Agreement to be effective as of the date first set forth above.

CITY OF CORONA	ELSINORE VALLEY MUNICIPAL WATER DISTRICT
By ______________	By ______________
Mayor	Phil Williams, President
Dated: April 21, 2009	Dated: March 25, 2009
Approved as to Form:	*Approved as to Form:*
______________	______________
	Aklufi & Wysocki
	District Counsel

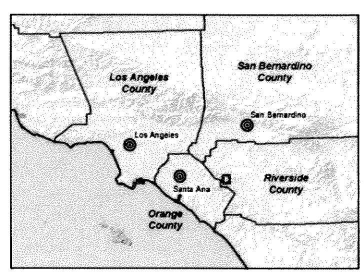


Production Wells (Symbolized by Ownership)

- Elsinore Valley Municipal Water District
- City of Corona
- Private Wells (locations not confirmed)

Production Wells (Symbolized by Status)

- Active
- Inactive
- Abandoned
- Unknown



Other Map Features

- Coldwater Basin Boundary
- Rivers & Streams

Prepared by:
WILDERMUTH ENVIRONMENTAL INC.
23692 Birtcher Drive
Lake Forest, CA 92630
949.420.3030
www.wildermuthenvironmental.com

EVMWD

CORONA

Author: CML/AEM/ETL
Date: 20081119
File: Exhibit_A_Ledger.mxd

Coldwater Basin

Basin Boundary and Well Locations

Exhibit A

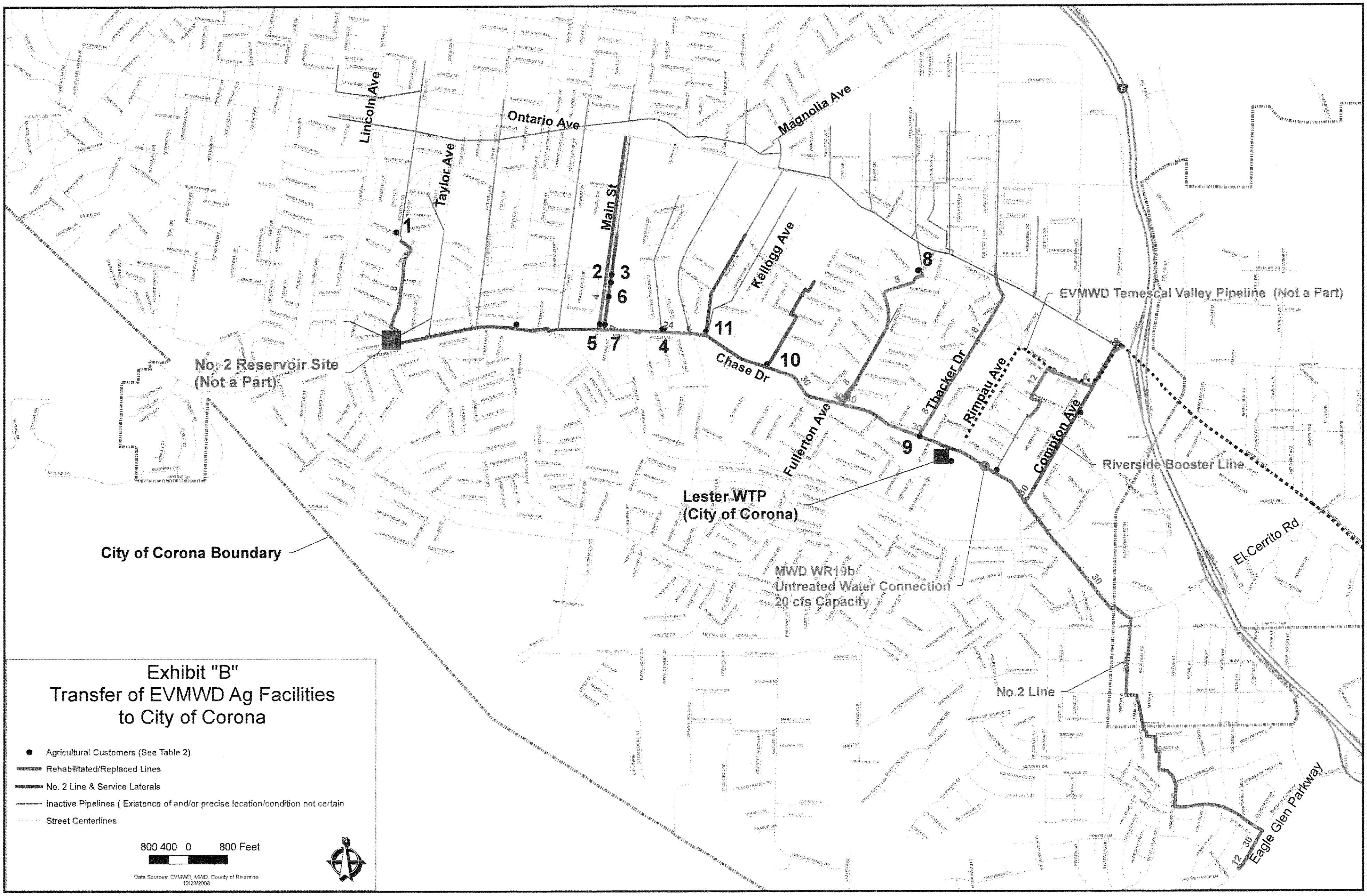


Exhibit "B"
Transfer of EVMWD Ag Facilities
to City of Corona
Agricultural Customers (See Table 2)
Rehabilitated/Replaced Lines
No. 2 Line & Service Laterals
Inactive Pipelines (Existence of and/or precise location/condition not certain
Street Centerlines
800 400 0 800 Feet
Data Sources: EVMWD, MWD, County of Riverside
Lincoln Ave
Taylor Ave
Ontario Ave
Main St
Magnolia Ave
Kellogg Ave
Chase Dr
Fullerton Ave
Thacker Dr
Rimpau Ave
Compton Ave
El Cerrito Rd
Eagle Glen Parkway
EVMWD Temescal Valley Pipeline (Not a Part)
Riverside Booster Line
No. 2 Reservoir Site
(Not a Part)
Lester WTP
(City of Corona)
MWD WR19b
Untreated Water Connection
20 cfs Capacity
No.2 Line
City of Corona Boundary
1
2
3
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8
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10
11

Appendix I

Tiered Rate Structure

ORDINANCE NO. 3309

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, MODIFYING THE BUDGET BASED WATER STRUCTURE AND ESTABLISHING RATES FOR POTABLE AND RECLAIMED WATER SERVICE FEES AND CHARGES AND TEMPORARY REVENUE STABILITY CHARGES

WHEREAS, the City of Corona (the "City"), through its Department of Water and Power ("DWP"), is charged with providing a continuous and adequate supply of safe and potable water and with developing and encouraging the use of reclaimed or recycled water to supplement existing potable water supplies, which services are funded primarily by the revenue derived from potable and reclaimed water service fees; and

WHEREAS, Chapters 13.14 and 13.28 of the Corona Municipal Code ("CMC") require that the City Council establish the rates for providing potable and reclaimed water services; and

WHEREAS, DWP engaged the services of Raftelis Financial Consultants, Inc. ("Raftelis") to perform an independent rate study to evaluate the infrastructure needs, programs and operations and maintenance costs of the City's potable and reclaimed water systems and the rates necessary to recover the costs of providing for those services for the next five years; and

WHEREAS, based upon the analysis in the rate study, it has been determined that increases in the rates for the City's potable and reclaimed water service charges are necessary to enable the City to recover current and projected costs of operations and maintenance and capital infrastructure improvements needed to repair and update the City's aging water and reclaimed water systems, maintain the operational and financial stability of the utility, comply with State mandated regulatory requirements, meet and comply with annual debt service requirements, avoid operational deficits and further depletion of reserves, and provide an equitable allocation of the costs of providing service among the various customer classes; and

WHEREAS, Raftelis studied the impact that the multi-year statewide drought has had on water revenues and the consequential reduction in water use and developed rates for Temporary Revenue Stability Charges to ensure that there are stable revenues to fund utility obligations going forward in the event that water use decreases during the current or future water shortages that may occur; and

WHEREAS, the proposed increases to the rates for the potable and reclaimed water service charges and the new Temporary Revenue Stability Charges ("TRSC") will allow the DWP to continue to provide safe, reliable drinking water to its customers; and

WHEREAS, DWP has experienced and anticipates additional inflationary increases to the costs to operate and maintain the City's potable water and reclaimed water systems (the "Systems") and to provide ongoing repairs, replacements, and upgrades to the Systems; and

WHEREAS, without the proposed rate increases and TRSC DWP would experience budget shortfalls for each year of the five-year forecast performed by Raftelis in the rate study; and

WHEREAS, California Constitution Article X, Section 2 and California Water Code Section 100 provide that because of conditions prevailing in the State of California, it is the declared policy of the State that the general welfare requires that the water resources of the State shall be put to beneficial use to the fullest extent of which they are capable, the waste or unreasonable use of water shall be prevented, and the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and the public welfare; and

WHEREAS, pursuant to California Water Code Section 106, it is the declared policy of the State that the use of water for domestic use is the highest use of water and that the next highest use is for irrigation; and

WHEREAS, pursuant to Ordinance No. 3025, the City Council previously adopted a Budget Based Water Rate Structure to implement a system of tiered water rates and charges based upon customer water budgets intended to (i) promote efficient water use and resource conservation; and (ii) proportionately allocate the cost of providing water service; and

WHEREAS, water budgets for residential customers, which have five tiers and includes a budget for indoor and outdoor use, are determined on the basis of individual household factors, such as the number of people per household, the size of the irrigated landscaped area, the amount of water a typical household requires each month for indoor and outdoor use, actual daily water lost to the atmosphere by plants (evapotranspiration) and an evapotranspiration area factor ("ETAF"); and

WHEREAS, water budgets for commercial, industrial, institutional and governmental customers with non-dedicated irrigation meters are determined on the basis of each customer's average water use during the last three years and water budgets for commercial, industrial, institutional and governmental customers with dedicated irrigation meters are determined in the same manner as residential customers; and

WHEREAS, the rate structure for the City's monthly water service fees include the following components: (1) a Ready-to-Serve Charge imposed on residential, non-residential and reclaimed water customers that is based on the size of the water meter serving the property; (2) a variable potable water Commodity Charge that is determined on the basis of the number of units of water delivered to the property; and (3) a reclaimed water Commodity Charge that is determined on the basis of the number of units of reclaimed water delivered to the property. The rate increases adopted by this Ordinance would impact both the Ready-to-Serve Charge and the Commodity Charge components of the water service fees and the reclaimed water fees; and

WHEREAS, the rate structure for the fire protection customers, which includes customers who are required as a condition of extending or initiating water service to install a private fire suppression system on their property and customers who have requested the delivery of water to the property for the purpose of fire service protection, is comprised of two components: (1) a variable fire protection Commodity Charge that is determined on the basis of the number of units of water delivered to a fire protection customer through the City's potable water system; and (2) a fixed Fireline Charge that is determined on the basis of the size of the fireline (in inches) through which water is delivered; and

WHEREAS, based upon the rate study prepared by Raftelis, it has been determined that the water budget tiers should be modified: (1) to reduce the efficient indoor water use standard from 60 gallons per person per day to 55 gallons per person per day to reflect the State's water use efficiency goals; (2) to reduce the ETAF from 114% to 80% to reflect the water needs of the specific type of plant mixes and irrigation efficiency as established in recently revised State water efficient landscape and irrigation guidelines; and (3) to revise the tier definitions as follows: inefficient use revised to 1%-50% over water budget (increased from 1%-20%), excessive use revised to 51%-100% over water budget (increased from 21%-40%), and wasteful use revised to greater than 100% over water budget (increased from 40%); and

WHEREAS, the rates adopted by this Ordinance have been calculated to meet the cost to the City of providing the services for which the rates and fees are imposed, without generating revenue that exceeds the funds required to provide the services, and without exceeding the proportional cost of service attributable to each customer; and

WHEREAS, the revenues derived from the rates adopted by this Ordinance will not exceed the funds required to provide the services for which the rates and charges are imposed and shall be used exclusively for maintenance and operation of the Systems and the provision of potable water and reclaimed water services; and

WHEREAS, the rates adopted by this Ordinance will not exceed the proportional cost of the services attributable to each parcel upon which they are imposed; and

WHEREAS, the rates adopted by this Ordinance will not be imposed on a parcel unless the services for which the rates and fees are imposed are actually used by, or immediately available to, the owner of the parcel; and

WHEREAS, the City, as the lead agency under the California Environmental Quality Act ("CEQA"), in consultation with the City's Legal Counsel, prepared a Preliminary Exemption Assessment for the adoption of this Ordinance in order to evaluate its potential impacts. The City determined that this Ordinance is exempt from CEQA review under Public Resources Code section 21080(b)(8) and State CEQA Guidelines section 15273 because the rates adopted by this Ordinance are necessary and reasonable to fund the administration, operation, maintenance, and improvements of the Systems and will not result in the expansion of the Systems; and

WHEREAS, pursuant to California Constitution article XIII D, section 6 ("Article XII D") at least 45 days prior to the public hearing on the proposed increase in the potable water service fees or the reclaimed water service fees, the City provided written notice (the "Notice") by mail to the record owner of each parcel upon which the rates and charges are proposed for imposition and any tenant directly liable for payment of the rates and charges, which Notice included the following information: (1) the amount of the rates and charges proposed to be imposed on each parcel; (2) the basis upon which the rates and charges were calculated; (3) the reason for the rates and charges; and (4) the date, time and location of a public hearing on the proposed rates and charges; and

WHEREAS, on December 4, 2019, the City Council held a duly noticed public hearing at which all persons wishing to testify in connection with the proposed increase in the potable water service fees and the reclaimed water service fees were heard and all protests against the proposed rates and fees were considered; and

WHEREAS, at the close of the hearing, the City Council determined that the City did not receive written protests against the establishment and imposition of the proposed rate increases for the potable water service fees or the reclaimed water service fees from a majority of the affected property owners or tenants directly liable for the payment of such fees.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

SECTION 1. The City Council finds and determines that the foregoing Recitals are true and correct and incorporates the Recitals herein.

SECTION 2. As the decision-making body for the City, the City Council has reviewed and considered the information contained in the Preliminary Exemption Assessment and administrative record. The City Council finds that the Preliminary Exemption Assessment contains a complete and accurate reporting of the environmental impacts associated with the adoption of this Ordinance and reflects the independent judgment of the City Council.

SECTION 3. The City Council hereby finds that the administration, operation, maintenance, and improvements of the Systems, which are to be funded by the potable water service fees and the reclaimed water service fees set forth herein, are necessary to maintain service within the City's existing service area. The City Council further finds that the administration, operation, maintenance, and improvements of the Systems, to be funded by the potable water service fees and the reclaimed water service fees set forth herein, will not expand the Systems. The City Council further finds that such potable water service fees and reclaimed water service fees are necessary and reasonable to fund the administration, operation, maintenance, and improvements of the Systems. Based on these findings, the City Council hereby determines that this Ordinance is exempt from the requirements of CEQA pursuant to California Public Resources Code section 21080(b)(8) and State CEQA Guidelines section 15273(a).

SECTION 4. The documents and materials that constitute the record of proceedings on which these findings have been based are located at City of Corona, 400 S. Vicentia Avenue, Corona, California 92882. The custodian for these records is the City Clerk of the City.

SECTION 5. The City Council hereby authorizes and establishes, by not less than a two-thirds (2/3) vote, the rates and charges for the City's potable water service fees, including, without limitation, the fees imposed upon fire protection customers, the City's reclaimed water service fees, and the rates and charges for the TRSC, as set forth in Exhibit "A," attached hereto and incorporated herein by reference, which rates and charges will be effective on February 16, 2020, with scheduled annual rate increases effective on January 1, 2021, January 1, 2022, January 1, 2023 and January 1, 2024. The City Council further authorizes and approves the modifications to the Budget Based Water Rate Structure adopted pursuant to Ordinance No. 3025 as set forth in Exhibit "A". Such rates and charges and modifications to the Budget Based Water Rate Structure shall be in effect beginning February 16, 2020.

SECTION 6. The City Council hereby authorizes and directs the DWP General Manager to implement and take all actions necessary to effectuate the rates adopted by this Ordinance and to file a Notice of Exemption with the County Clerk for Riverside County within five (5) working days of the date of the adoption of this Ordinance.

SECTION 7. If any section, subsection, subdivision, sentence, clause, or phrase in this Ordinance or any part thereof is for any reason held to be unconstitutional or invalid, ineffective by any court of competent jurisdiction, such decision shall not affect the validity or effectiveness of the remaining portions of this Ordinance or any part thereof. The City Council hereby declares that it would have adopted each section irrespective of the fact that any one or more subsections, subdivisions, sentences, clauses, or phrases be declared unconstitutional, invalid, or ineffective.

SECTION 8. This Ordinance shall supersede all other previous City Council resolutions and ordinances that may conflict with, or be contrary to, this Ordinance.

SECTION 9. In accordance with California Government Code section 36933(a), within fifteen days after its passage the City Clerk shall cause this Ordinance to be published at least once, with the names of those City Council members voting for or against it, in a newspaper of general circulation published and circulated within the City. If there is no such newspaper, the City Clerk shall cause the Ordinance to be posted in at least three public places in the City or published in a newspaper of general circulation printed and published in the county and circulated in the City.

SECTION 10. This Ordinance shall become effective thirty (30) days from and after its final passage.

PASSED, APPROVED AND ADOPTED this 15th day of January, 2020.

____
Mayor of the City of Corona, California

ATTEST:

____
City Clerk of the City of Corona, California

CERTIFICATION

I, Sylvia Edwards, City Clerk of the City of Corona, California, do hereby certify that the foregoing Ordinance was regularly introduced at a regular meeting of the City Council of the City of Corona, California, duly held the 4th day of December, 2019 and thereafter adopted at a regular meeting thereof held on the 15th day of January, 2020, by the following vote:

AYES:

NOES:

ABSTAINED:

ABSENT:

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Corona, California, this 15th day of January, 2020.

____
City Clerk of the City of Corona, California

(SEAL)

EXHIBIT "A"

RATES AND CHARGES FOR POTABLE WATER SERVICE FEES AND RECLAIMED WATER SERVICE FEES

Potable Water Budget Tier Modifications
Residential Customers

Water Budget Factors	Current	Proposed
Gallons per capita per day (GPCD)	60	55
Evapotranspiration Area Factor (ETAF)	114%	80%
Inefficient Use Definition	1%-20% over water budget	1%-50% over water budget
Excessive Use	21-40% over water budget	51-100% over water budget
Wasteful Use	Greater than 40% over water budget	Greater than 100% over water budget

Potable and Reclaimed Water Budget Tier Modifications
Non-Residential and Reclaimed Water Customers

Water Budget Factors	Current	Proposed
Evapotranspiration Area Factor (ETAF)	114%	80%
Inefficient Use Definition	1%-20% over water budget	1%-50% over water budget
Excessive Use	21-40% over water budget	51-100% over water budget
Wasteful Use	Greater than 40% over water budget	Greater than 100% over water budget

Current and Proposed Rates for Potable Water Commodity Charges ($/CCF)
Residential Customers

Tier	Tier Width Definition	Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
1	Water use up to efficient indoor water budget	$2.10	$1.57	$1.65	$1.74	$1.83	$1.93
2	Water use up to efficient outdoor water budget	$2.33	$2.26	$2.38	$2.50	$2.63	$2.77
3	Water use 1%-50% over water budget (Indoor+Outdoor)	$3.17	$4.49	$4.72	$4.96	$5.21	$5.48
4	Water use 51%-100% over water budget (Indoor+Outdoor)	$6.35	$7.48	$7.86	$8.26	$8.68	$9.12
5	Water use greater than 100% over water budget (Indoor+Outdoor)	$11.64	$11.17	$11.73	$12.32	$12.94	$13.59

Current and Proposed Rates for Potable Water Commodity Charges ($/CCF)
Non-Residential Customers

Tier	Definition	Current	Feb. 16 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
1	Water use up to efficient water budget	$2.33	$2.26	$2.38	$2.50	$2.63	$2.77
2	Water use 1%-50% over water budget	$3.17	$4.49	$4.72	$4.96	$5.21	$5.48
3	Water use 51%-100% over water budget	$6.35	$7.48	$7.86	$8.26	$8.68	$9.12
4	Water use greater than 100% over water budget	$11.64	$11.17	$11.73	$12.32	$12.94	$13.59

Current and Proposed Rates for Potable Water Commodity Charges ($/CCF)
Non-Residential Customers with Dedicated Irrigation Meters

Tier	Definition	Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
1	Water use up to efficient outdoor water budget	$2.33	$2.26	$2.38	$2.50	$2.63	$2.77
2	Water use 1%-50% over water budget (Indoor+Outdoor)	$3.17	$4.49	$4.72	$4.96	$5.21	$5.48
3	Water use 51%-100% over water budget (Indoor+Outdoor)	$6.35	$7.48	$7.86	$8.26	$8.68	$9.12
4	Water use greater than 100% over water budget (Indoor+Outdoor)	$11.64	$11.17	$11.73	$12.32	$12.94	$13.59

Current and Proposed Rates for Potable Water Monthly Ready-to-Serve Charges ($/Meter Size in Inches)
Residential and Non-Residential

Meter Size	Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
5/8”	$19.23	$22.28	$23.40	$24.57	$25.80	$27.09
3/4”	$25.23	$29.98	$31.48	$33.06	$34.72	$36.46
1”	$36.09	$45.38	$47.65	$50.04	$52.55	$55.18
1 1/2”	$62.90	$83.88	$88.08	$92.49	$97.12	$101.98
2”	$91.80	$130.08	$136.59	$143.42	$150.60	$158.13
3”	$156.91	$276.38	$290.20	$304.71	$319.95	$335.95
4”	$241.02	$491.98	$516.58	$542.41	$569.54	$598.02
6”	$442.64	$1,238.88	$1,300.83	$1,365.88	$1,434.18	$1,505.89
8”	$651.04	$2,162.88	$2,271.03	$2,384.59	$2,503.82	$2,629.02
10”	$651.04	$3,240.88	$3,402.93	$3,573.08	$3,751.74	$3,939.33

Current and Proposed Rates for Fire Protection Commodity Charges ($/CCF)
Fire Protection Customers

Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
$3.17	$5.40	$5.67	$5.96	$6.26	$6.58

Current and Proposed Rates for Reclaimed Water Commodity Charges ($/CCF)
Reclaimed Water Customers

Tier	Definition	Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
1	Water use up to efficient water budget	$1.51	$1.65	$1.79	$1.94	$2.03	$2.14
2	Water use up to 1%-50% over water budget	$2.27	$2.47	$2.70	$2.91	$3.06	$3.21
3	Water use up to 51%-100% over water budget	$3.02	$3.29	$3.59	$3.88	$4.07	$4.27
4	Water use greater than 100% over water budget	$4.53	$4.94	$5.38	$5.81	$6.10	$6.41

Current and Proposed Rates for Reclaimed Water Monthly Ready-to-Serve Charges
($/Meter Size in Inches)
Reclaimed Water Customers

Meter Size	Current	Feb. 16 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
5/8”	$18.90	$18.12	$19.75	$21.33	$22.40	$23.52
3/4”	$24.79	$23.74	$25.88	$27.95	$29.34	$30.81
1”	$35.46	$34.97	$38.12	$41.17	$43.23	$45.39
1 1/2”	$61.79	$63.06	$68.74	$74.23	$77.95	$81.84
2”	$90.18	$96.77	$105.48	$113.92	$119.61	$125.59
3”	$154.12	$203.51	$221.83	$239.57	$251.55	$264.13
4”	$236.76	$360.81	$393.28	$424.75	$445.98	$468.28
6”	$434.82	$905.74	$987.26	$1,066.24	$1,119.55	$1,175.53
8”	$639.52	$1,579.89	$1,722.08	$1,859.85	$1,952.84	$2,050.48
10”	$639.52	$2,366.39	$2,579.37	$2,785.71	$2,925.00	$3,071.25

Current and Proposed Rates for Monthly Fireline Charges ($/Fireline Size in Inches)
Fire Protection Customers

Fireline Size	Current	Feb. 16, 2020	Jan. 1, 2021	Jan. 1, 2022	Jan. 1, 2023	Jan. 1, 2024
5/8”	$16.25	$7.06	$7.42	$7.80	$8.19	$8.60
3/4”	$16.25	$7.06	$7.42	$7.80	$8.19	$8.60
1”	$16.25	$7.06	$7.42	$7.80	$8.19	$8.60
1 1/2”	$16.25	$7.06	$7.42	$7.80	$8.19	$8.60
2”	$16.25	$7.99	$8.40	$8.82	$9.27	$9.74
2 1/2”	$21.50	$8.88	$9.33	$9.80	$10.29	$10.81
4”	$42.75	$13.78	$14.47	$15.20	$15.96	$16.76
6”	$78.25	$26.92	$28.27	$29.69	$31.18	$32.74
8”	$115.25	$49.58	$52.06	$54.67	$57.41	$60.29
10”	$152.00	$83.66	$87.85	$92.25	$96.87	$101.72

Proposed Rates for Temporary Revenue Stability Charges (TRSC) ($/CCF)

Water Conservation Stages	Water Reduction Target	TRSC ($/CCF)
Stage 1	0%	N/A
Stage 2	10-15%	N/A
Stage 3	16-20%	$0.15
Stage 4	21-40%	$0.45
Stage 5	>40%	$0.84

CITY OF CORONA
Courtesy Reminder Rate Change Year 2

On January 15, 2020, the City Council adopted Ordinance No. 3309 approving the water rates and charges that went into effect on February 16, 2020, with scheduled annual rate increases effective on January 1, 2021, January 1, 2022, January 1, 2023 and January 1, 2024. As such, effective January 1, 2021, the Ready-To-Serve and commodity rates will change. For any questions, contact us at (951) 736-2321 or by e-mail at CustomerCare@CoronaCA.gov.

POTABLE

Ready-To-Serve Monthly Charges

Meter Size	Current	Effective Jan. 1, 2021
5/8"	$22.28	$23.40
3/4"	$29.98	$31.48
1"	$45.38	$47.65
1½"	$83.88	$88.08
2"	$130.08	$136.59
3"	$276.38	$290.20
4"	$491.98	$516.58
6"	$1,238.88	$1,300.83
8"	$2,162.88	$2,271.03
10"	$3,240.88	$3,402.93

Residential Per Unit Tiered Rates

Tier	Current	Effective Jan. 1, 2021
1	$1.57	$1.65
2	$2.26	$2.38
3	$4.49	$4.72
4	$7.48	$7.86
5	$11.17	$11.73

Non-residential Per Unit Tiered Rates

Tier	Current	Effective Jan. 1, 2021
1	$2.26	$2.38
2	$4.49	$4.72
3	$7.48	$7.86
4	$11.17	$11.73

RECLAIMED

Ready-To-Serve Monthly Charges

Meter Size	Current	Effective Jan. 1, 2021
5/8"	$18.12	$19.75
3/4"	$23.74	$25.88
1"	$34.97	$38.12
1½"	$63.06	$68.74
2"	$96.77	$105.48
3"	$203.51	$221.83
4"	$360.81	$393.28
6"	$905.74	$987.26
8"	$1,579.89	$1,722.08
10"	$2,366.39	$2,579.37

Per Unit Tiered Rates

Tier	Current	Effective Jan. 1, 2021
1	$1.65	$1.79
2	$2.47	$2.70
3	$3.29	$3.59
4	$4.94	$5.38

FIRELINE

Ready-To-Serve Monthly Charges

Meter Size	Current	Effective Jan. 1, 2021
5/8"	$7.06	$7.42
3/4"	$7.06	$7.42
1"	$7.06	$7.42
1½"	$7.06	$7.42
2"	$7.99	$8.40
2½"	$8.88	$9.33
4"	$13.78	$14.47
6"	$26.92	$28.27
8"	$49.58	$52.06
10"	$83.66	$87.85

Per Unit Rate

Current	Effective Jan. 1, 2021
$5.40	$5.67

CORONA THE CIRCLE CITY Established May 4, 1886 To Cherish Our Past · To Plan Our Future

CONTACT US

(951) 736-2321
CustomerCare@CoronaCA.gov
www.CoronaCA.gov/DWP

CITY OF CORONA

Recordatorio de Cortesía Cambio de Tarifa Año 2

El 15 de enero de 2020, el Concejo Municipal adoptó la Ordenanza No. 3309 aprobando las tarifas y cargos de agua que entraron en vigencia el 16 de febrero de 2020, con aumentos de tarifas anuales programados efectivos el 1 de enero de 2021, 1 de enero de 2022, 1 de enero de 2023 y 1 de enero de 2024. Por lo tanto, a partir del 1 de enero de 2021, el cargo fijo de preparacion por el servicio (cargo RTS) y el cargo variable por el servicio basico de agua potable y reciclada cambiaran. Si tiene alguna pregunta, contáctenos al (951) 736-2321 o por correo electrónico a CustomerCare@CoronaCA.gov.

AGUA POTABLE

Cargos mensuales de preparacion para el servicio

Tamaño de Medidor	Actual	Efectivo el 1 de enero de 2021
5/8"	$22.28	$23.40
3/4"	$29.98	$31.48
1"	$45.38	$47.65
1 ½"	$83.88	$88.08
2"	$130.08	$136.59
3"	$276.38	$290.20
4"	$491.98	$516.58
6"	$1,238.88	$1,300.83
8"	$2,162.88	$2,271.03
10"	$3,240.88	$3,402.93

Tarifas para los cargos basicos de agua por unidad (residencial)

Nivel	Actual	Efectivo el 1 de enero de 2021
1	$1.57	$1.65
2	$2.26	$2.38
3	$4.49	$4.72
4	$7.48	$7.86
5	$11.17	$11.73

Tarifas para los cargos basicos de agua por unidad (no residencial)

Nivel	Actual	Efectivo el 1 de enero de 2021
1	$2.26	$2.38
2	$4.49	$4.72
3	$7.48	$7.86
4	$11.17	$11.73

AGUA RECICLADA

Cargos mensuales de preparacion para el servicio

Tamaño de Medidor	Actual	Efectivo el 1 de enero de 2021
5/8"	$18.12	$19.75
3/4"	$23.74	$25.88
1"	$34.97	$38.12
1 ½"	$63.06	$68.74
2"	$96.77	$105.48
3"	$203.51	$221.83
4"	$360.81	$393.28
6"	$905.74	$987.26
8"	$1,579.89	$1,722.08
10"	$2,366.39	$2,579.37

Tarifas para los cargos basicos de agua por unidad

Nivel	Actual	Efectivo el 1 de enero de 2021
1	$1.65	$1.79
2	$2.47	$2.70
3	$3.29	$3.59
4	$4.94	$5.38

LINEA DE PREVENCION DE INCENDIOS

Cargos mensuales de preparacion para el servicio

Tamaño de Medidor	Actual	Efectivo el 1 de enero de 2021
5/8"	$7.06	$7.42
3/4"	$7.06	$7.42
1"	$7.06	$7.42
1 ½"	$7.06	$7.42
2"	$7.99	$8.40
2 ½"	$8.88	$9.33
4"	$13.78	$14.47
6"	$26.92	$28.27
8"	$49.58	$52.06
10"	$83.66	$87.85

Tarifas para los cargos basicos de agua por unidad

Actual	Efectivo el 1 de enero de 2021
$5.40	$5.67

CORONA THE CIRCLE CITY Established May 4, 1896 To Cherish Our Past - To Plan Our Future

CONTACTANOS

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www.CoronaCA.gov/DWP

Appendix J

WMWD 2020 Urban Water Management Plan

2020 Urban Water Management Plan

Public Review Draft

MAY 18, 2021 | WESTERN MUNICIPAL WATER DISTRICT

WESTERN MUNICIPAL WATER DISTRICT

Draft 2020 Urban Water Management Plan

Public Review Draft

MAY 18, 2021

Prepared by Water Systems Consulting, Inc.

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ACRONYMS & ABBREVIATIONS

°F	Degrees Fahrenheit
AF	Acre Foot
AFY	Acre Feet per Year
AMR	Automatic Meter Reader
APA	Administrative Procedures Act
AWWA	American Water Works Association
BMP	Best Management Practice
CALWARN	California Water/Wastewater Agency Response Network
CCF	Hundred Cubic Feet
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFS	Cubic Feet per Second
CII	Commercial, Industrial, and Institutional
CIMIS	California Irrigation Management Irrigation System
CUWCC	California Urban Water Conservation Council
DCR	DWR SWP Delivery Capacity Report
DDW	SWRCB Division of Drinking Water
DMM	Demand Management Measure
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	United States Environmental Protection Agency
ERNIE	Emergency Response Network of the Inland Empire
ET	Evapotranspiration
ETo	Reference Evapotranspiration
GIS	Geographic Information System
GPCD	Gallons per Capita per Day
GPM	Gallons per Minute
HECW	High Efficiency Clothes Washer
HET	High Efficiency Toilet
LAFCO	Local Agency Formation Commission
MAF	Million Acre-Feet

MCL	Maximum Contaminant Level
MF	Multi-family
MG	Million Gallons
MGD	Million Gallons per Day
MOU	Memorandum of Understanding
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
QWEZ	Qualified Water Efficient Landscaper
RIX	Rapid Infiltration and Extraction
RPA	Reasonable and Prudent Alternative
RUWMP	Regional Urban Water Management Plan
RWQCB	Regional Water Quality Control Board
SBX7-7	Senate Bill 7 of Special Extended Session 7
SF	Single Family
SOC	Synthetic Organic Chemicals
SOI	Sphere of Influence
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TCE	Trichloroethylene
ULFT	Ultra-Low Flush Toilet
UV	Ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
WBIC	Weather Based Irrigation Controller
WSCP	Water Shortage Contingency Plan
WFF	Water Filtration Facility
WSS	Water Sense Specification
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

Part 1

Introduction

1

WESTERN MUNICIPAL WATER DISTRICT

Introduction

This chapter provides a brief overview of Western Municipal Water District (Western) and the purpose of this Urban Water Management Plan (UWMP). It also describes how the UWMP is organized and how it relates to other local and regional planning efforts that Western is involved in.

IN THIS SECTION

- About Western
- Purpose of the Plan
- Plan Organization
- Relation to Other Documents

This document presents the 2020 UWMP for Western. Western supplies water on both a wholesale (Western Wholesale) and a retail (Western Retail) basis and this document addresses the UWMP requirements for each in separate sections. The Western Wholesale system also includes Western Retail as a customer.

Western is a public agency headquartered in Riverside, California. Western was formed in 1954 to provide water to the growing western Riverside County through local and imported sources.

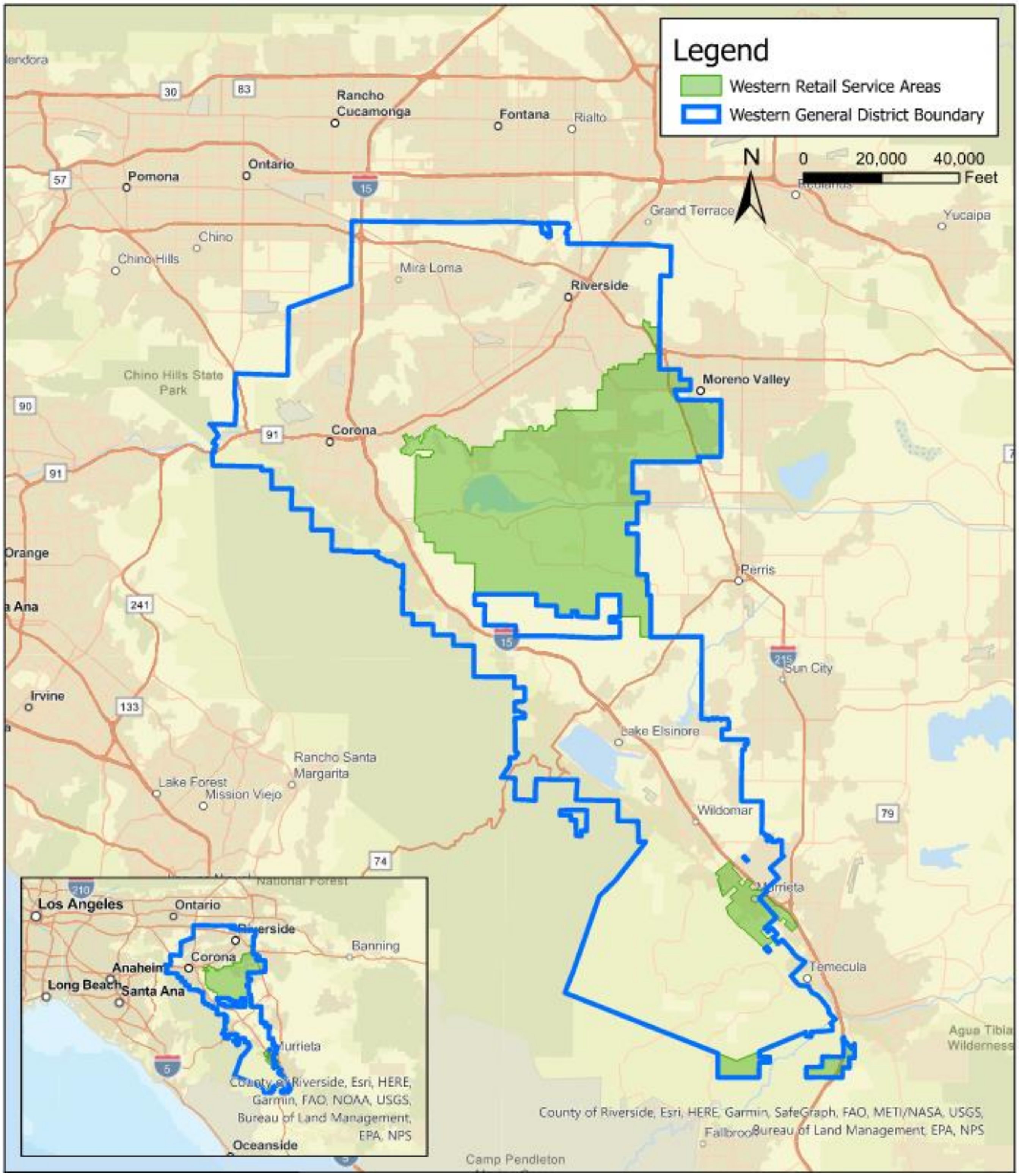
Today, Western provides water supply, wastewater treatment and disposal, and water resource management to nearly one million people in a service area covering roughly 527-square miles, shown in **Figure 1-1**. In total, Western sells approximately 80,000 acre-feet (AF) of water each year and operates two wastewater treatment plants and a groundwater desalination plant.

As a member agency of the Metropolitan Water District of Southern California (Metropolitan), Western Wholesale provides wholesale water to the region within their service area, which includes the cities of Corona, Norco and Riverside and the water agencies serving Box Springs, Eagle Valley, Elsinore Valley, Temescal Valley, and Temecula.

Western Retail also directly serves water to approximately 25,000 retail customers in the unincorporated areas of El Sobrante, Eagle Valley Temescal Creek, Woodcrest, Lake Mathews, March Air Reserve Base and Rainbow, as well as portions of the cities of Riverside and Murrieta.

Western is one of the five member agencies of the Santa Ana Watershed Project Authority (SAWPA), a joint powers authority that conducts regional water resources planning and project implementation within the Santa Ana River Watershed.

Figure 1-1. Western Wholesale and Western Retail Service Area Boundaries



1.1 Urban Water Management Plan Purpose

In 1983, the State of California Legislature (Legislature) enacted the Urban Water Management Planning Act (UWMP Act). The law required an urban water supplier, providing water for municipal purposes to more than 3,000 customers or serving more than 3,000 AF annually, to adopt an Urban Water Management Plan every five years demonstrating water supply reliability under normal as well as drought conditions. The UWMP Act applies to wholesale and retail suppliers. In 2020, Western Wholesale provided nearly 75,000 AF of water to its wholesale customers (including Western Retail). In 2020, Western Retail delivered over 25,000 AF of water to nearly 25,000 service connections throughout its retail service areas. Therefore, Western Wholesale and Western Retail are required to prepare an UWMP so Western's UWMP must meet the requirements for both.

Since the original UWMP Act was passed, it has undergone significant expansion to address a broad range of issues that impact the water supply reliability of each water supplier, including prolonged droughts, groundwater overdraft and changing climatic conditions. The current UWMP Act requirements are found in Sections 10610-10656 and 10608 of the California Water Code.

DWR provides guidance on preparing an UWMP to meet and understand the requirements in the California Water Code by developing an UWMP Guidebook, conducting workshops, developing tools, and providing program staff to help water suppliers prepare comprehensive and useful water management plans, and implement water conservation programs. Suppliers prepare their own UWMPs in accordance with the requirements and submit them to DWR. DWR then reviews the plans to make sure they have addressed the requirements identified in the California Water Code for completeness and submits a report to the Legislature summarizing the status of the plans for each five-year cycle.

The purpose of this UWMP is for water suppliers to evaluate their long-term resource planning and establish management measures to ensure adequate water supplies are available to meet existing and future demands. The UWMP provides a framework to help water suppliers maintain efficient use of urban water supplies, continue to promote conservation programs and policies, ensure that sufficient water supplies are available for future beneficial use, and provide a mechanism for response during drought conditions or other water supply interruptions.

The UWMP is a valuable planning tool used for multiple purposes including:

- Provides a standardized methodology for water utilities to assess their water resource needs and availability.
- Serves as a resource to the community and other interested parties regarding water supply and demand, conservation and other water related information.
- Provides a key source of information for cities and counties when considering approval of proposed new developments and preparing regional long-range planning documents such as city and county General Plans.
- Informs other regional water planning efforts.

California Water Code Section 10632 also includes updated requirements for suppliers to prepare a Water Shortage Contingency Plan (WSCP). The WSCP documents a supplier's plans to manage and mitigate an actual water shortage condition, should one occur because of drought or other impacts on water supplies. In the 2015 UWMP cycle, the WSCP was part of the UWMP. For the 2020 update, the WSCP is required to be a standalone document so that it can be updated independently of the UWMP but must be referenced in and attached to the 2020 UWMP. An overview of the WSCP requirements are described in the body of this UWMP and the standalone WSCP is attached as **Appendix A**.

1.2 Plan Organization

This document was prepared in compliance with the California Water Code and the 2020 guidelines established by DWR and constitutes Western's 2020 UWMP for both Western Wholesale and Western Retail.

The 2020 UWMP is organized in four parts:

PART 1: INTRODUCTION

Chapter 1 – Introduction

Chapter 2 – Outreach and Engagement

Chapter 3 – Service Area Description

PART 2: WESTERN WHOLESALE

Chapter 4 – Wholesale Water Supply

Chapter 5 – Wholesale Water Use

Chapter 6 – Wholesale Water Service Reliability and Drought Risk Assessment

Chapter 7 – Wholesale Demand Management Measures

Chapter 8 – Wholesale Water Shortage Contingency Plan

PART 3: WESTERN RETAIL

Chapter 9 – Retail Water Supply

Chapter 10 – Retail Water Use

Chapter 11 – Retail Water Service Reliability and Drought Risk Assessment

Chapter 12 – Retail Demand Management Measures

Chapter 13 – Retail Water Shortage Contingency Plan

PART 4: SUPPORTING INFORMATION

References

Appendices

Throughout this report, water volume is represented in units of acre-feet (AF). Data is presented on a calendar year basis.

1.3 Relation to Other Efforts

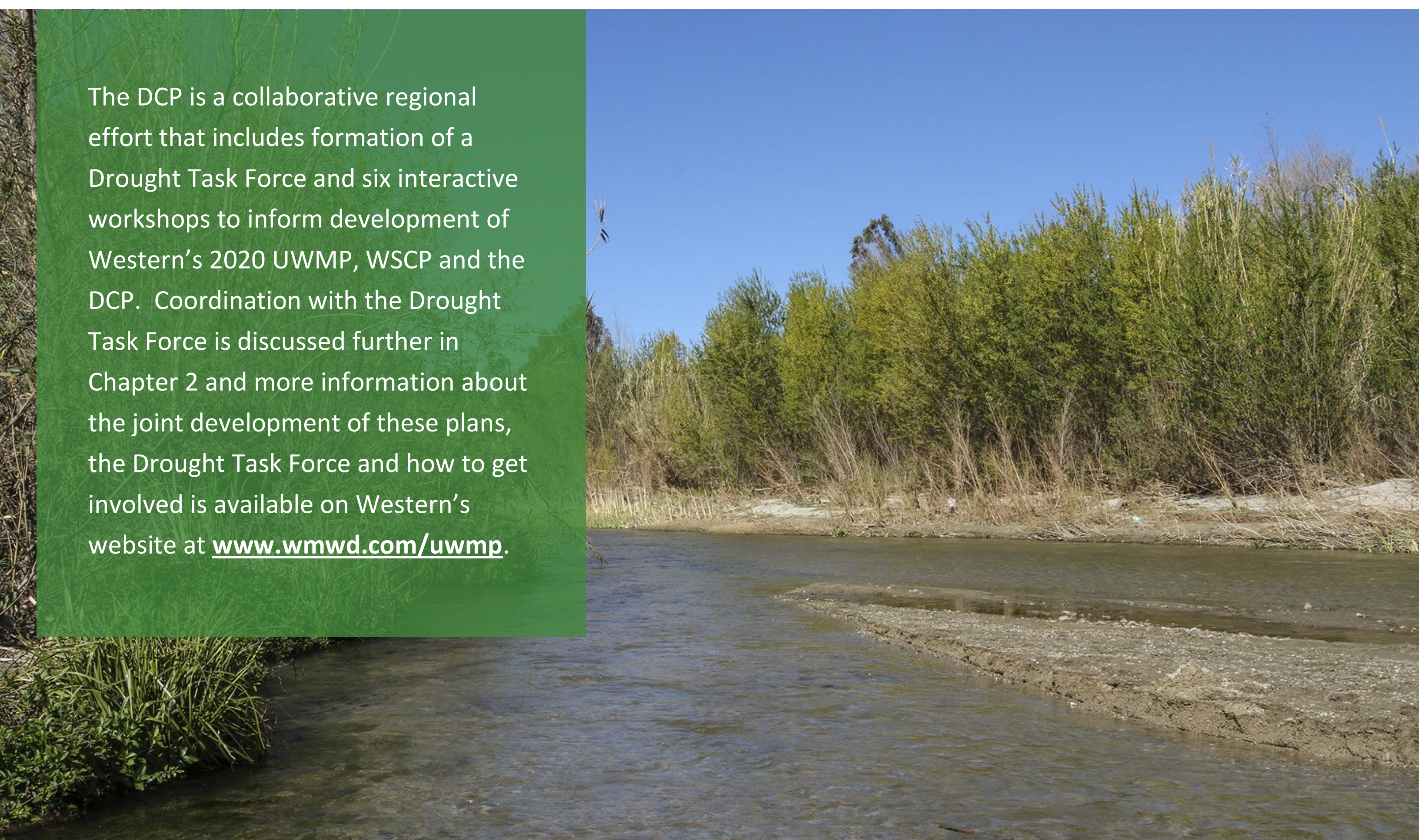
In addition to the 2020 UWMP, Western is involved in several other internal and external planning efforts and collaborates with a variety of stakeholders to achieve coordination and consistency between the various planning documents, especially those prepared by Western.

provides an overview of the many related planning efforts and how they integrate with the various elements of Western's 2020 UWMP. Elements of other plans that directly inform the development of this UWMP are shaded in gray.

1.3.1 Western Drought Contingency Plan

Western received a grant from the United States Bureau of Reclamation (Reclamation) to prepare a Drought Contingency Plan (DCP) consistent with Reclamation's Drought Response Program Framework. The Drought Response Framework provides assistance to water users and managers to conduct drought contingency planning, including consideration of risks and uncertainties related to changing hydrologic conditions, and to take actions that will build long-term resiliency to drought.

The DCP has many elements in common with elements of the UWMP and WSCP, such as supply and demand analysis, climate change vulnerability and water shortage response actions. Therefore, the two plans are being prepared in parallel as a joint project with a coordinated schedule and approach. This allows Western to capture efficiencies in simultaneous development of the documents and to fully align the analysis and recommendations of both plans. The DCP will be prepared over a two-year timeframe and will be completed by the end of 2022, but some elements that inform the 2020 UWMP were escalated in the DCP schedule to meet the earlier UWMP submittal deadline of July 1, 2021.



The DCP is a collaborative regional effort that includes formation of a Drought Task Force and six interactive workshops to inform development of Western's 2020 UWMP, WSCP and the DCP. Coordination with the Drought Task Force is discussed further in Chapter 2 and more information about the joint development of these plans, the Drought Task Force and how to get involved is available on Western's website at **www.wmwd.com/uwmp**.

Figure 1-2. UWMP Relation to Other Planning Efforts

Plan elements with a direct link to this UWMP

			PLAN AREA FOCUS			PLAN TOPICS					
PLANNING DOCUMENT	PREPARED BY	DOCUMENT PROGRESS STATUS	WESTERN WHOLESALE	WESTERN RETAIL	REGIONAL OR STATE	SUPPLIES / RELIABILITY	DEMANDS / WATER USE EFFICIENCY	INFRASTRUCTURE	CLIMATE CHANGE	RISK AND MITIGATION	WATER SHORTAGE & EMERGENCY RESPONSE
WESTERN 2020 UWMP	Western	■■■■■ This UWMP	✓	✓		✓	✓		✓	✓	✓
WATER SHORTAGE CONTINGENCY PLAN	Western	■■■■■ Developed as part of 2020 UWMP	✓	✓		✓	✓		✓	✓	✓
WESTERN DROUGHT CONTINGENCY PLAN	Western in collaboration with Drought Task Force	■■■□□ Under Development as part of 2020 UWMP	✓	✓	✓	✓	✓	✓	✓	✓	✓
WESTERN RETAIL FACILITIES MASTER PLANS	Western	■■■□□ Under development		✓			✓	✓			
RIVERSIDE RETAIL SERVICE AREA BUILD-OUT DEMAND ANALYSIS	Western	■■■■■ Completed in 2019		✓			✓				
MURRIETA SERVICE AREA BUILD-OUT DEMAND ANALYSIS	Western	■■■■■ Completed in 2018		✓			✓				
ARLINGTON BASIN GROUNDWATER SUSTAINABILITY PLAN (GSP)	Western in collaboration with the Arlington Groundwater Sustainability Agency (GSA)	■■■□□ Under development	✓	✓	✓	✓			✓	✓	
AWIA RISK AND RESILIENCE ASSESSMENT AND EMERGENCY RESPONSE PLAN	Western	■■■■■ Completed	✓	✓		✓		✓		✓	
LOCAL HAZARD MITIGATION PLAN	Western	■■■■■ Completed in 2017	✓	✓		✓		✓		✓	
METROPOLITAN INTEGRATED RESOURCES PLAN (IRP) AND 2020 UWMP	MWD in collaboration with Western and other member agencies	■■■□□ Under development	✓	✓	✓	✓	✓		✓	✓	✓
2019 WATER USE EFFICIENCY (WUE) MASTER PLAN	Western	■■■■■ Completed in 2019		✓			✓				
LOCAL RETAIL AGENCY 2020 UWMPS	Local retail water suppliers	■■■□□ Under development			✓	✓	✓		✓	✓	✓
2020 UPPER SANTA ANA WATERSHED INTEGRATED REGIONAL URBAN WATER MANAGEMENT PLAN	San Bernardino Valley Municipal Water District in collaboration with Western and other agencies	■■■□□ Under development			✓	✓	✓		✓	✓	✓
ONE WATER ONE WATERSHED PLAN	SAWPA in collaboration with Western and others	■■■■■ Completed in 2019			✓	✓	✓		✓	✓	✓

2 WESTERN MUNICIPAL WATER DISTRICT
Outreach and Engagement

This chapter describes the outreach and engagement activities conducted by Western during preparation of the 2020 UWMP, the various stakeholders involved in preparation of this UWMP along with the public review and adoption process.

Throughout preparation of this UWMP, Western actively engaged with stakeholders, including cities, counties, water agencies, and the public to inform them of Western's efforts and activities, gather the best available data for use in developing this UWMP, and coordinate planning activities with other related regional plans and initiatives.

Western employed a combination of outreach efforts, which were designed to educate decision-makers and customers about key plan decisions and engagement activities, which are designed to influence the development of the UWMP by curating the perspective of select stakeholders at key plan milestones.

Details regarding the key outreach and engagement efforts conducted by Western as part of the UWMP development are presented in this chapter.

IN THIS SECTION

- Outreach and Engagement Overview
- Stakeholders
- Plan Review, Adoption, and Submittal

2.1 Stakeholders

Western actively engaged with diverse stakeholder groups throughout the development of the UMWP. The various stakeholder groups involved with the UWMP and their role is summarized below in **Table 2-1**. Each stakeholder group and the methods of outreach and engagement are described in the following sections.

Table 2-1. Key Stakeholders and Roles

	ROLE FOR UWMP			
STAKEHOLDER GROUP	INFORM / EDUCATE	GATHER PERCEPTIONS / OPINIONS	ADVISE	DECIDE
Drought Task Force	X	X	X	
Engineering, Operations, Water Resources (EOWR) Committee	X	X	X	
Western Board of Directors				X
General Public	X	X		

OUTREACH
One-way communication to educate, inform

ENGAGEMENT
Multi-directional communication to inform plan decisions

2.1.1 Drought Task Force

As described in **Chapter 1**, the UWMP was developed in parallel with a Drought Contingency Plan. As part of this combined effort, Western recruited, convened and engaged a Drought Task Force comprised of 29 organizations represented by knowledgeable community leaders who can offer diverse, informed perspectives to support effective drought contingency planning as well as inform Western's UWMP and WSCP. The members of the Drought Task Force organized by stakeholder segment group are presented in **Table 2-2**. All of the retail water agencies in Western's service area are represented on the Drought Task Force.

During the UWMP preparation, the Task Force members participated in two interactive workshops to share their perspectives to inform development of elements of the UWMP, WSCP and DCP, and will continue to participate in approximately four more workshops to complete the development of the DCP by the end of 2022.

Table 2-2. Drought Task Force Members

SEGMENT	PERCENT REPRESENTATION	ORGANIZATION
Environmental and Conservation Groups	14%	Inland Empire Resource Conservation District
		Inland Empire Waterkeeper
		Riverside-Corona Resource Conservation District
		Santa Ana Watershed Project Authority
Environment and Social Justice	3%	Center for Community Action and Environmental Justice
Regional Government	7%	Riverside County Flood Control and Water Conservation District
		Western Riverside Council of Governments
Research	7%	University of California, Riverside
		Water Resources Institute
Local Government	3%	City of Murrieta
Retail: Customer Stakeholder	17%	Altman Plants
		March Air Reserve Base
		Vons/Kroger
		Woodcrest MAC
		Woodcrest MAC/Riverside County
Tribal representatives	4%	Pechanga Tribal Government
Water Agency: Regional	10%	Eastern Municipal Water District
		Metropolitan Water District of Southern California
		San Bernardino Valley Municipal Water District
Water Agency: Retail Agencies in Western service area	34%	Box Springs Mutual Water Company
		City of Corona
		City of Norco
		Elsinore Valley Municipal Water District
		Jurupa Community Services District
		Rancho California Water District
		Riverside Highland Water Company
		Riverside Public Utilities
		Rubidoux Community Services District
		Temescal Valley Water District

2.1.2 Western Engineering, Operations and Water Resources (EOWR) Committee

Western's EOWR Committee serves as an advisor to UWMP development. To keep the Committee informed and provide opportunity for input on key plan milestones, Western staff provided project updates at EOWR public meetings spanning the UWMP development. The EOWR Committee was provided the opportunity to review and provide comment on the draft UWMP.

2.1.3 Western Board of Directors

Western's Board of Directors (Board) is the formal decision-making body that adopts the UWMP and recommends it for submittal to DWR. To keep the Board informed, Western staff provided periodic updates at public Board meetings, spanning the UWMP development.

2.1.4 General Public

To reach all customers within Western's service area, Western created a specific web page for the UWMP and DCP, available at **https://wmwd.com/UWMP**. This webpage provides another opportunity for interested individuals to learn about the UWMP and DCP planning efforts, view the Drought Task Force participants and workshop schedules, subscribe to project updates, review and comment on both plans, and links to past resources or plans.

In addition to the project website, Western staff distributed timely informational notices to the public to raise awareness about the project and encourage participation in public comment periods through email bulletins, social media posts and newspaper publications.

The Draft UWMP was made available for public review in mid-May, 2021.

The Western Board conducted a public hearing on June 16, 2021 to receive public comments and consider adoption of the Draft UWMP and Draft WSCP. The public comment period and public hearing was noticed twice in local English and Spanish newspapers:

English language: Press Enterprise notices published on April 15 and April 22, 2021

Spanish language: La Prenza notices published on April 16 and April 23, 2021

The hearing notices are attached as **Appendix B**.

2.1.5 Other Stakeholder Outreach

60-Day Notices

To fulfill the requirements of Water Code Section 10621(c), Western sent letters of notification of preparation of the 2020 UWMP to all cities and counties within Western's service area 60 days prior to the public hearing. All organizations that were provided the 60-day notification letter were notified a second time about the availability of the draft 2020 UWMP and public hearing scheduled for June 16, 2021. Copies of the 60-day notification letters are attached as **Appendix C**.

The following agencies were notified:

- Box Springs Mutual Water Company
- City of Corona
- City of Corona, Department of Water and Power
- City of Eastvale
- City of Jurupa Valley
- City of Lake Elsinore
- City of Murrieta
- City of Norco
- City of Riverside
- City of Temecula
- County of Riverside
- Eagle Valley Mutual Water Company
- Elsinore Valley Municipal Water District
- Home Gardens County Water District
- Home Gardens Sanitary District
- Jurupa Community Services District
- Metropolitan Water District of Southern California
- Rancho California Water District
- Riverside Highland Water Company
- Riverside Public Utilities
- Rubidoux Community Services District
- Temescal Valley Water District

Metropolitan and Retail Agency Coordination

Western coordinated with Metropolitan to provide information on projected supplies and demands within Western's wholesale service area. Metropolitan prepared estimates of Western Wholesale's demand for imported water and provided their estimates to Western for including in this UWMP.

Western also coordinated with each of the retail water agencies in their service area to obtain updated supply and demand projections for inclusion in the Western Wholesale supply reliability analysis.

2.2 Plan Adoption, and Submittal

Western made the draft 2020 UWMP available on-line at **https://wmwd.com/UWMP** and at Western's headquarters for public review on in mid-May 2021.

The final 2020 UWMP was formally adopted by Western on June 16, 2021. A copy of the Adoption Resolution is included in **Appendix D**. The WSCP was also adopted on June 16, 2021, as described in the WSCP, attached in **Appendix A**.

Copies of the final 2020 UWMP and 2020 WSCP were sent to the California State Library, DWR (electronically using the WUEdata reporting tool), and all cities and counties within Western's service area within 30 days of adoption.

Western made copies of the final UWMP and WSCP available on its website and at its office within 30 days after the adoption.

3

WESTERN MUNICIPAL WATER DISTRICT

Service Area Description

This chapter describes Western's wholesale and retail service areas, customers, and land uses, as well as population, demographics, and climate features.

IN THIS SECTION

- Western Service Areas
- Population and Demographics
- Climate

3.1 Western Wholesale Service Area

The Western Wholesale service area encompasses 527 square miles that spans from the northern Riverside County boundary to the southern Riverside County boundary. Western's wholesale service area is also bounded by the Riverside County line to the west and by Eastern Municipal Water District to the east. As a member agency of Metropolitan, Western provides wholesale supplemental water to the region within their service area. In total, there are fourteen (14) retail water agencies, shown on the following page, within Western Wholesale's service area, including Western Retail, that currently receive or can receive water from Western. **Figure 3-1** illustrates their respective service areas within the Western Wholesale boundary.

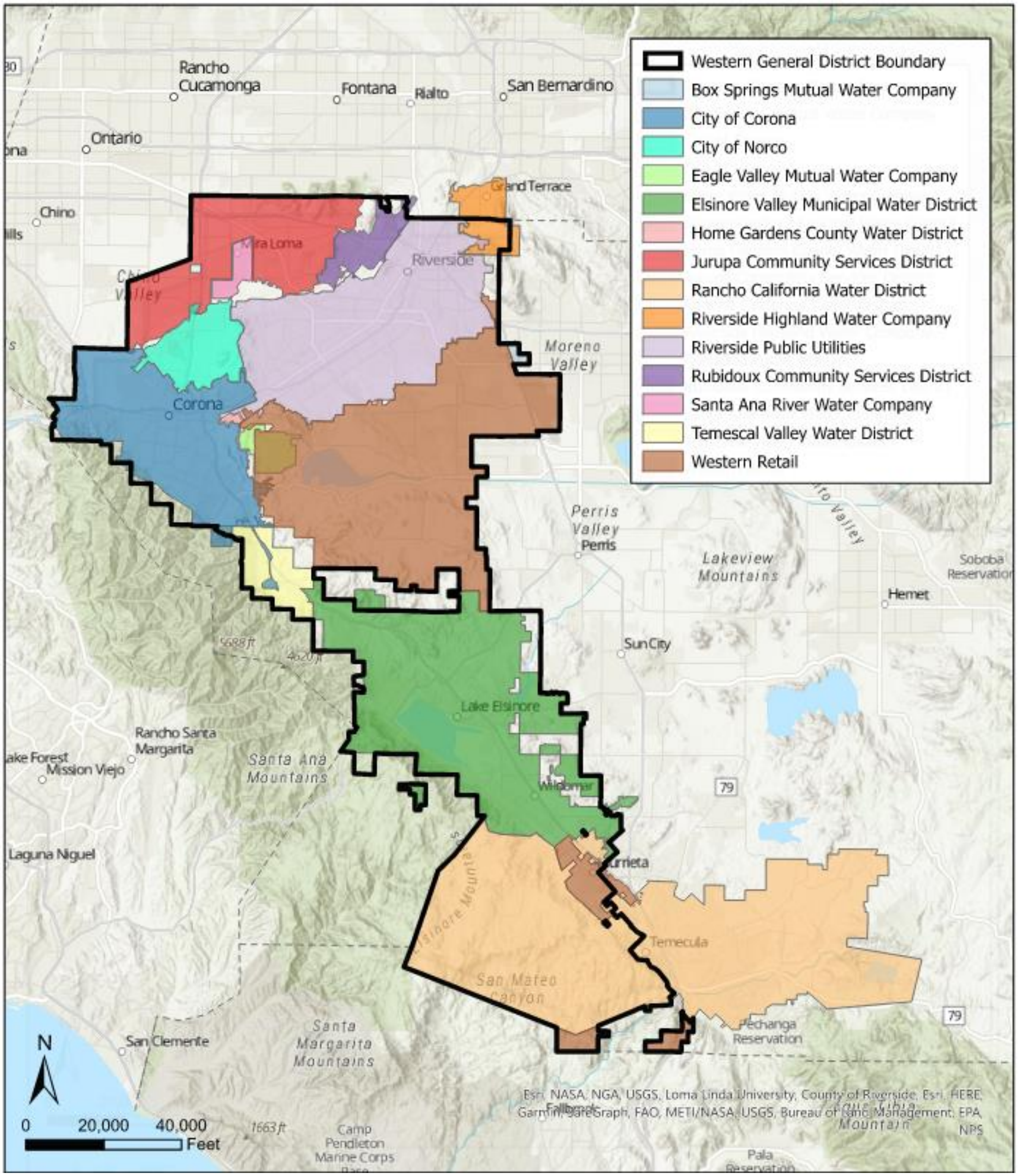
Retail Water Agencies in Western Wholesale Service Area

Box Springs Mutual Water District
City of Corona
City of Norco
Eagle Valley Mutual Water Company
Elsinore Valley Municipal Water District
Home Gardens County Water District
Jurupa Community Services District
Rancho California Water District
Riverside Highlands Water Company
Riverside Public Utilities
Rubidoux Community Services District
Santa Ana River Water Company
Temescal Valley Water District
Western Retail

Of the retail water agencies in the Western Wholesale service area, eight received wholesale water from Western Wholesale in 2020. These agencies are referred to as wholesale customers in this Plan. Western considers Western Retail a wholesale customer and is therefore included in wholesale system descriptions throughout this Plan. In addition to purchasing both wholesale treated and untreated water from Western Wholesale, most of these retail agencies also deliver local surface and groundwater and/or recycled water within their respective service areas.

The remaining six retail agencies currently utilize solely local supplies. It is anticipated that some of these six may utilize Western wholesale supplies in the future as the region grows (refer to **Chapter 4,** Wholesale Water Supply).

Figure 3-1. Western Wholesale Service Area and Customers



3.2 Western Retail Service Area

Western provides water to nearly 25,000 customer connections, such as single-family residences or commercial businesses, within its retail service area, including the Riverside Retail System, Murrieta Retail System, and Rainbow Retail System, as shown in **Table 3-1**. These three service areas are collectively referred to as Western Retail and cover a total of 104 square miles and serve water to an estimated population of nearly 100,000.

Table 3-1. Western Retail System Connections

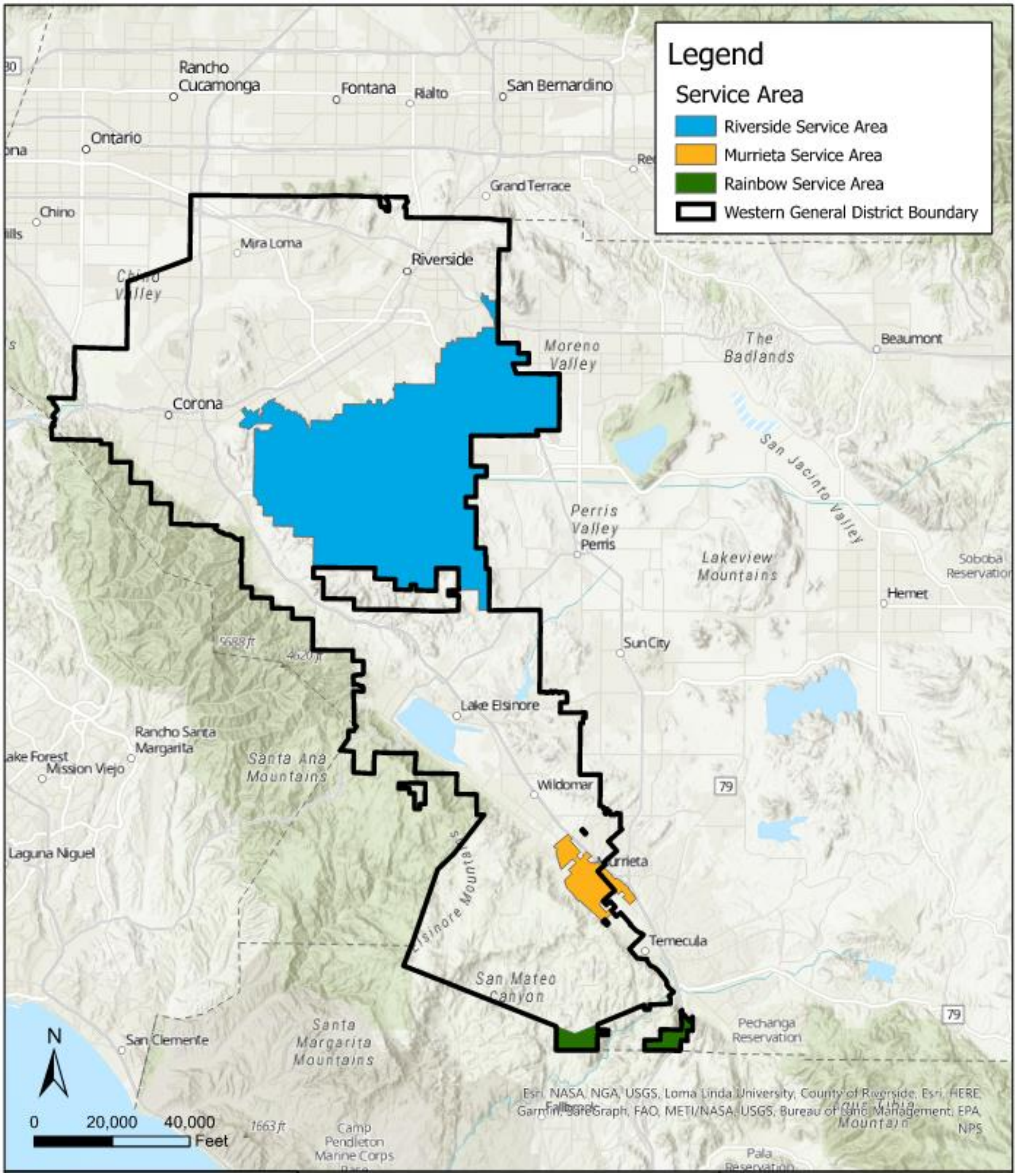
WESTERN RETAIL SYSTEM	NUMBER OF RETAIL CONNECTIONS IN 2020
Riverside Retail System	21,657
Murrieta Retail System	2,946
Rainbow Retail System	42
TOTAL	**24,645**

The Riverside Service Area includes a portion of the City of Riverside and unincorporated areas of Riverside County, including the communities of El Sobrante, Eagle Valley, Temescal Creek, Woodcrest, Lake Matthews, and March Air Reserve Base.

In 2005, Western took ownership of the Murrieta County Water District as a separate retail service area, now called the Murrieta Service Area. The entire area lies within the city of Murrieta.

Western Retail also serves a very small area, called the Rainbow Service Area, in an area just south of the City of Temecula in the unincorporated portion of Riverside County.

Figure 3-2. Western Retail Service Areas



3.3 Service Area Population and Demographics

Western provides service to nearly one million people in both a wholesale and retail capacity. A summary of population by service area is provided in the following section.

3.3.1 Service Area Population

Population estimates for Western's wholesale service area was developed using demographic projections from the Southern California Association of Governments (SCAG) Connect SoCal: The 2020-2045 Regional Transportation Plan/Sustainable Community Strategy (September 2020). SCAG routinely forecasts population, housing, and employment estimates as well as develops transportation plans to support growing population and housing needs throughout the region.

SCAG provided updated population, housing, and employment estimates for 2020, 2035, and 2045. This data is organized by Transportation Analysis Zones (TAZ). Because TAZ do not align with Western's service area, a geographical analysis in ArcGIS was used to determine the growth that is projected to occur within Western's service area. For intermediate years, the average annual rate of growth was determined and applied to find the population for 2025, 2030, and 2040. Estimates for 2020 and future year population are provided in **Table 3-2**. The population estimates for Western Wholesale include Western Retail.

Population within Western retail was estimated using a 2.2% increased and is based on growth rates established in recent master planning efforts. Modifications to Western retail population were made to better represent recent trends in growth that are anticipated to continue. SCAG growth estimates for Western's retail service areas did not appear to accurately represent near term future growth when compared to project development and permitting records.

Western's retail service area does not experience substantial seasonal changes in population. Some slight changes are observable in the area adjacent to the University of California Riverside campus in the northern portion of the Riverside Service Area.

Table 3-2. Population Projections for Western Wholesale

	2020	2025	2030	2035	2040	2045
WESTERN WHOLESALE[1]	**979,634**	**1,025,334**	**1,077,603**	**1,131,288**	**1,177,721**	**1,225,915**
WESTERN RETAIL	**94,898**	**105,865**	**118,100**	**131,749**	**146,976**	**163,958**
Riverside	79,044	87,652	97,260	107,981	120,293	134,013
Murrieta	15,676	18,011	20,610	23,506	26,389	29,621
Rainbow	178	202	231	262	294	324

[1] Western Wholesale includes Western Retail population and represents the total population within Western's general district boundary.

3.3.2 Other Social, Economic, and Demographic Factors

Based on 2015-2019 data, the United States Census Bureau (Census) estimates that households within Riverside County are composed of 3.28 people per household and approximately 74% of households are single-family residences.

Riverside County is a relatively diverse area. Census data reported that of the people identifying as one race alone, 60% were White. Approximately 4.4% identified as two or more races. Of the total population, an estimated 35.3% identified as White non-Hispanic and 48.9% as Hispanic (United States Census Bureau, n.d.).

According to research from UC Riverside School of Business Center for Economic Forecasting and Development, before the COVID-19 pandemic, employment in the Inland Empire was expanding at a steady pace, based on data from California's Employment Development Department. From October 2018 to October 2019, the region added 30,900 nonfarm jobs, a 2.0% increase. This surpassed the 1.8% gains in the state and the 1.4% gains in the nation. Although pre-pandemic the employment growth for the Inland Empire remained steady, growth has slowed compared with recent years; total nonfarm employment grew 3.0% from October 2017 to October 2018 and 3.8% from October 2016 to October 2017 (University of California, Riverside School of Business, 2020).

The Inland Empire's labor market has continued to recover from the COVID-19 pandemic, adding 93,100 jobs since lows in April 2020. Despite ongoing employment recovery, year-over-year employment fell 7.1%. However, it is estimated that employment growth throughout the Inland Empire is outpacing that of the entire state (University of California, Riverside School of Business, 2020).

3.4 Land Uses within Service Area

SCAG prepares demographic forecasts based on land use data through an extensive process that emphasizes input from local planners in coordination with local or regional land use authorities, incorporating essential information to reflect anticipated future populations and land uses. SCAG's projections undergo extensive local review, incorporate zoning information from city and county general plans, and are supported by Environmental Impact Reports. Land use within Western's wholesale service area obtained from SCAG is shown in **Table 3-3**.

Table 3-3. Land Uses within Western's General Service Area

LAND USE	ACREAGE	PERCENTAGE OF TOTAL SERVICE AREA
Single Family Residential	156,332	47%
Multi-Family Residential	4,039	1%
Mixed Residential	2,298	1%
Rural Residential	11,305	3%
Commercial and Services	6,773	2%
General Office	483	0%
Facilities	11,132	3%
Education	569	0%
Industrial	14,985	5%
Transportation, Communications, and Utilities	470	0%
Mixed Commercial and Industrial	7,202	2%
Mixed Residential and Commercial	1,985	1%
Open Space and Recreation	56,535	17%
Agriculture	900	0%
Water	6,920	2%
Specific Plan	14,004	4%
Other	36,020	11%
TOTAL	**331,955**	**100%**

3.5 Service Area Climate

Western's climate is characterized by typical hot, dry summers, and mild winters. **Table 3-4** presents average climate data for the service area, including temperature, rainfall, and reference evapotranspiration (ETo). As shown in **Table 3-4**, the warmest month of the year is August with an average temperature of 85.0 degrees Fahrenheit (°F), while the coldest month of the year is December with an average temperature of 59.8°F.

The annual average precipitation within Western's boundary is about 8.8 inches. As shown in **Table 3-4**, the majority of rainfall occurs in the months of December through March. December is typically the wettest month with an average rainfall of approximately 2.3 inches.

Table 3-4. Historical Climate Data

	AVERAGE TEMPERATURE (°F) [1]	AVERAGE PRECIPITATION (IN.) [1]	AVERAGE STANDARD ETO (IN.) [1]
January	61.2	1.84	2.84
February	61.5	1.48	3.39
March	65.2	1.19	5.08
April	68.8	0.67	6.36
May	71.3	0.27	6.98
June	78.0	0.01	7.80
July	83.7	0.20	8.30
August	85.0	0.21	8.09
September	82.4	0.26	6.37
October	75.0	0.39	4.62
November	66.3	0.83	3.21
December	59.8	2.34	2.53

[1]CIMIS weather station 44 at UC Riverside; https://cimis.water.ca.gov/. Data from 2010 through 2020.

3.5.1 Climate Change

As part of this UWMP, Western considered the impacts of climate change on future water supplies and demands and water supply reliability. There are several studies that evaluate the potential impacts of climate change within the Western Wholesale and Retail areas.

Santa Ana Watershed Basin Study

SAWPA and the United States Bureau of Reclamation (USBR) completed the Santa Ana Watershed Basin Study (Basin Study) in 2013 as a complementary study to SAWPA's Integrated Regional Water Management planning process for the Santa Ana Watershed. As part of the Basin Study, USBR prepared a Climate Change Analysis for the Santa Ana River Watershed, included as **Appendix E**. The analysis evaluated frequently asked questions reading impacts to climate change on the Santa Ana River Watershed. The key findings most relevant to Western's water supply reliability are (U.S Department of the Interior Bureau of Reclmanation, August 2013):

- Annual surface water is likely to decrease over future periods;
- Precipitation shows somewhat long-term decreasing trends;
- Temperature will increase, which is likely to cause increased water demand and reservoir evaporation;
- More precipitation will fall as rain instead of snow;
- Projected decreases in precipitation and increases in temperature will decrease natural recharge throughout the basin;
- Management actions such as reducing municipal and industrial water demands or increasing recharge will be required to maintain current groundwater levels.

Metropolitan 2020 UWMP

In their Draft 2020 UWMP, Metropolitan addresses the uncertainties of climate change on water supply planning, identifying several areas of concern:

- Reduction in Sierra Nevada snowpack;
- Increased intensity and frequency of extreme weather events;
- Prolonged drought periods;
- Water quality issues associated with increase in wildfires;
- Changes in runoff pattern and amount; and
- Rising sea levels resulting in:
    - Impacts to coastal groundwater basins due to seawater intrusion;
    - Increased risk of damage from storms, high-tide events, and the erosion of levees; and
    - Potential pumping cutbacks on the SWP

Hydrologic variability, potential climate change, and regulatory risk are embedded in Metropolitan's modeling efforts. Metropolitan's modeling utilizes historical hydrologic conditions from 1992 to 2017 to simulate expected demands on Metropolitan supplies, as well as capacities and constraints of its storage facilities and supply program. The Water Reliability Assessment and the Drought Risk Assessment in Metropolitan's Draft 2020 UWMP demonstrates that Metropolitan is able to mitigate the challenges posed by hydrologic variability, potential climate change, and regulatory risk on its imported supply sources through the significant storage capabilities it has developed over the last two decades, both dry-year and emergency storage (Metropolitan Water District of Southern California, 2021).

Metropolitan's 2020 IRP, which is currently under development, is further addressing ways to account for and mitigate the uncertainties associated with climate change.

Western Drought Contingency Plan – Climate Change Vulnerability Assessment

As part of the DCP that is currently being developed, a Climate Change Vulnerability Assessment (CCVA) for the Western service area was prepared to improve the understanding of climate change impacts on future water demand and local water supplies within Western's wholesale service area during normal and drought periods (GEI Consultants, April 2021). The CCVA technical memorandum provides details on the climate model data sources, climate analysis approach, calculation of the various supply and demand change factors. The complete CCVA is provided in **Appendix F**.

DWR has developed statewide climate change datasets to for use in the water resource planning that depict climate conditions in California under historical and future climate conditions. The DWR climate data used in the CCVA was assembled from 20 global climate models, to best represent anticipated climate conditions in California. The CCVA analysis was based on the median projected change from the majority of the selected climate models. DWR's California specific data is broken down into grid cells that are approximately 1/16th degree (approximately 3.75 miles) for the entire state. Each grid cell contains monthly time series based on 1915 to 2011 used to forecast future precipitation and evapotranspiration (ET) under 2030 and 2070 climate conditions.

Based on the timeseries data, climate change factors pertaining to supply and demand for normal, single dry, and 5-year dry periods were determined. The change factors represent the ratio of a simulated future value to the corresponding simulated historical value. The time series for precipitation and corresponding change factor can be used to estimate changes in supply while the time series for evapotranspiration and corresponding change factor can be used to estimate changes in demand. The results of the CCVA show:

- Decreases in water supplies from the Santa Ana and Santa Margarita River basins under normal and drought conditions
- Decreases in precipitation and increases in surface water evaporation resulting from increased temperatures
- Smaller decreases in precipitation and natural groundwater recharge under normal and multi-year drought conditions. Results for a single-dry year anticipate slightly wetter future conditions compared to the 2020 baseline
- Precipitation will occur during shorter rainy seasons at a higher intensity
- Increases in outdoor water use under normal and drought conditions resulting from increased temperatures and higher ET rates

Western is proactively planning to adapt to and mitigate the effects of climate change. Western is involved in various efforts to recharge local groundwater basins, which will help mitigate the effects of expected declines in natural groundwater recharge. Western also has an industry leading conservation program to promote water use efficiency across its wholesale and retail service areas. Western will continue to prioritize actions to adapt to and mitigate climate change to minimize impacts to supply reliability therefore, the climate change factors developed in the CCVA were not applied directly to the supply and demand projections in this UWMP.

As part of the ongoing DCP development, Western plans to analyze the extreme climate scenarios developed by DWR to characterize the range of potential impacts of climate change for the purposes of developing drought response and mitigation measures for the DCP, which will be completed in 2022.

Climate change can also impact water resources indirectly. For example, wildfire hazards are projected to increase in southern California with climate change. Wildfires can impact water resources by increasing water requirements for firefighting, changing surface vegetation and runoff patterns in burn areas, causing debris flows, and increasing siltation of reservoirs and hydraulic structures.

Part 2

Western Wholesale

4

WESTERN MUNICIPAL WATER DISTRICT

Wholesale Water Supply

This chapter describes the water supplies Western Wholesale uses to meet wholesale demands, which include desalinated local groundwater and imported water from Metropolitan. In addition, a summary of the total water use and various water sources within the region is provided.

The retail water agencies within Western's general service area boundary use a variety of local groundwater, surface water, and recycled water sources to meet customer demands. In addition, Western Wholesale provides desalinated groundwater and imported water as supplemental supplies to their wholesale customers.

IN THIS SECTION

- Regional Water Sources
- Water Supply Characterization
- Energy Intensity

4.1 Regional Supplies

This section summarizes all of the water supplies available to the region within the Western Wholesale boundary, including local and imported water supplies.

4.1.1 Imported Water

Western purchases imported water from Metropolitan and sells to wholesale customers within Western's service area, including Western Retail. Metropolitan imports water from the State Water Project (SWP), which conveys water from the Bay-Delta to Southern California via the California Aqueduct, and from the Colorado River through the Colorado River Aqueduct (CRA). The supply mix varies depending on the availability of SWP supplies, which varies every year, much more significantly than the Colorado River supply. During the recent drought, water allocations from SWP were significantly reduced, leading to a greater proportion of Colorado River supplies in Metropolitan's supply mix.

Additional wholesalers within the region include Eastern Municipal Water District (Eastern), who also provides imported water to the portion of Rancho California Water District (RCWD) that falls within Eastern' s wholesale service area and to Western's Murrieta Retail System.

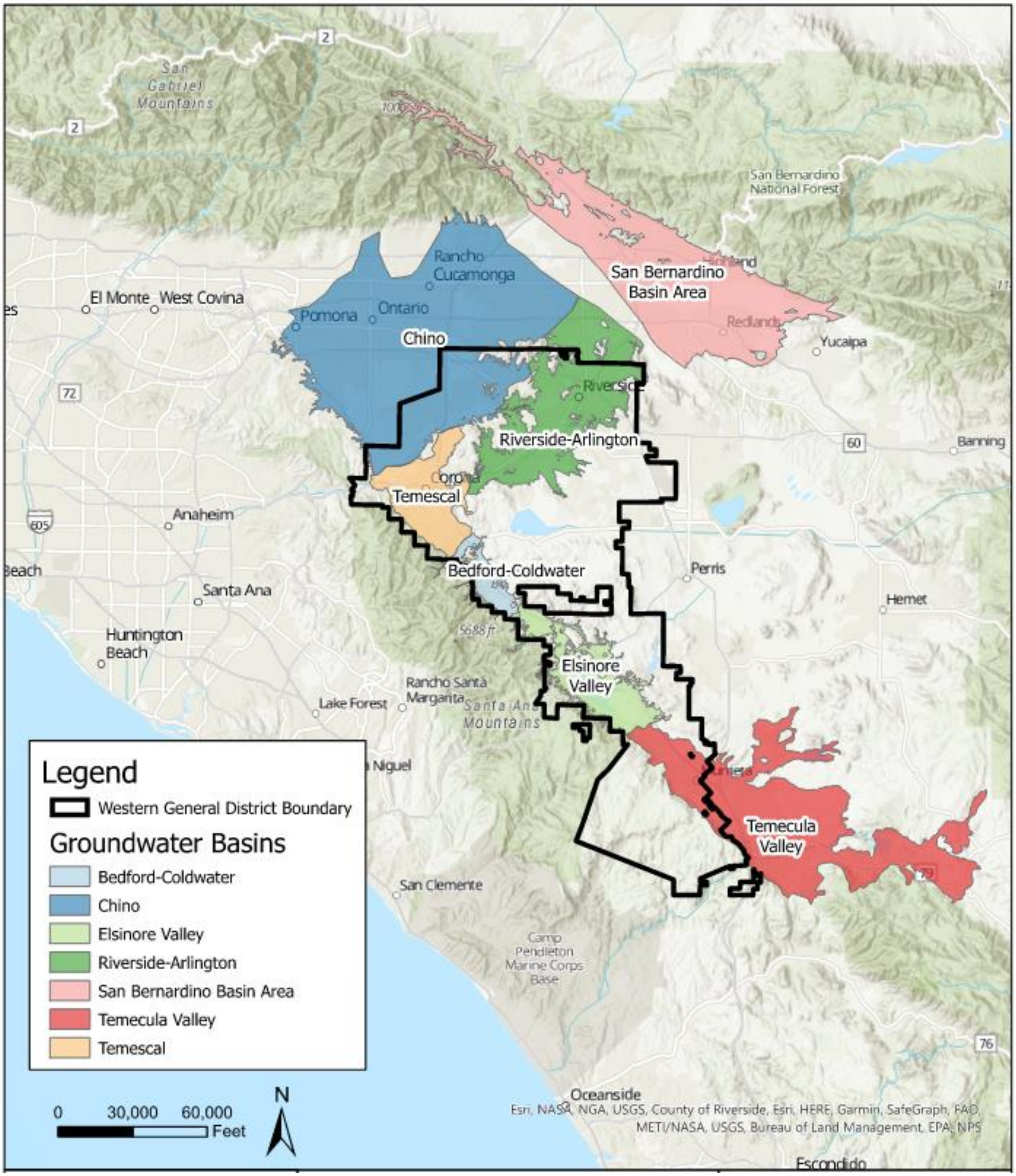
4.1.2 Groundwater

The region also uses local groundwater from seven different groundwater basins, San Bernardino Basin Area (SBBA), Chino Basin, Riverside-Arlington Basin, Temescal Basin, Bedford-Coldwater Basin, Elsinore Valley Basin, and Temecula Valley Basin. The locations of these basins are shown in **Figure 4-1**. Each of these basins is either adjudicated and managed by a Watermaster or managed by a Groundwater Sustainability Agency to ensure long term reliably supply, even in dry years.

Western Wholesale uses supply from the Riverside-Arlington Basin, which is described in detail in Section 4.2.2.

Western Retail uses supply from the SBBA, Chino Basin and Temecula Valley Basin, which are described in more detail in Section 9.2.2.

Figure 4-1. Local Groundwater Basins



4.1.3 Recycled Water

Several retail water agencies in the region, including Western Retail, also use recycled water to meet non-potable demands. Recycled water sources in the region include:

- Western Water Recycling Facility (WWRF)
- Western Riverside County Regional Wastewater Treatment Plant (WRCRWTP), operated by Western and owned by Western Riverside County Regional Wastewater Authority (WRCRWA), a joint powers authority (JPA) composed of the cities of Norco and Corona, Jurupa Community Services District, Home Gardens Sanitary District, and Western
- City of Corona water reclamation facilities WRF1, WRF2 and WRF3
- EVMWD Regional Water Recycling Facility
- EVMWD Railroad Canyon Water Recycling Facility
- EVMWD Horsethief Canyon Water Recycling Facility
- Santa Rosa Water Recycling Facility, overseen by Western, EVMWD, and RCWD through a JPA
- City of Riverside Water Quality Control Plant
- Temecula Valley Water Reclamation facility, owned and operated by Temescal Valley Water District

Western Retail has access to recycled water supply from the WWRF and WRCRWA plants, which are described in detail in Section 0.

4.1.4 Surface Water

EVMWD uses surface water from Canyon Lake, also referred to as Railroad Canyon Reservoir. Recently, Canyon Lake has experienced water quality issues and is currently not an active supply source for EVMWD. EVMWD is working to install a treatment system to recover the supply and anticipates resuming use by 2025.

4.1.5 Stormwater

Capturing stormwater for supplemental groundwater recharge is a key strategy in the region to increase local supplies, enhance long term sustainability of local groundwater basins and help mitigate the effects of climate change on local supplies.

There are various stormwater capture facilities throughout the region and additional projects are currently under development, including the Riverside North Aquifer Storage and Recovery (ASR) Project. The Riverside North ASR project is a partnership between Western, San Bernardino Valley Municipal Water District (Valley District) and RPU. The project consists of proposed in-channel and off-channel recharge along the Santa Ana River. The proposed off-channel recharge facility location is along the west side of the Santa Ana River and proposes the construction of up to eight individual recharge basins encompassing approximately 25 acres. The in-channel recharge basin proposes construction of an inflatable dam across the Santa Ana River channel, which can be raised and lowered depending on the amount of water flowing in the river. This project is estimated to recharge an average of approximately 6,000 acre-feet of water per year. The in-channel and off-channel water captured will be recharged into the Riverside North sub basin of the Riverside-Arlington Basin and a portion of the retained water will be diverted to the Riverside Canal pipeline for direct use. The project is currently in the environmental and permitting phase and is anticipated to be constructed by 2025.

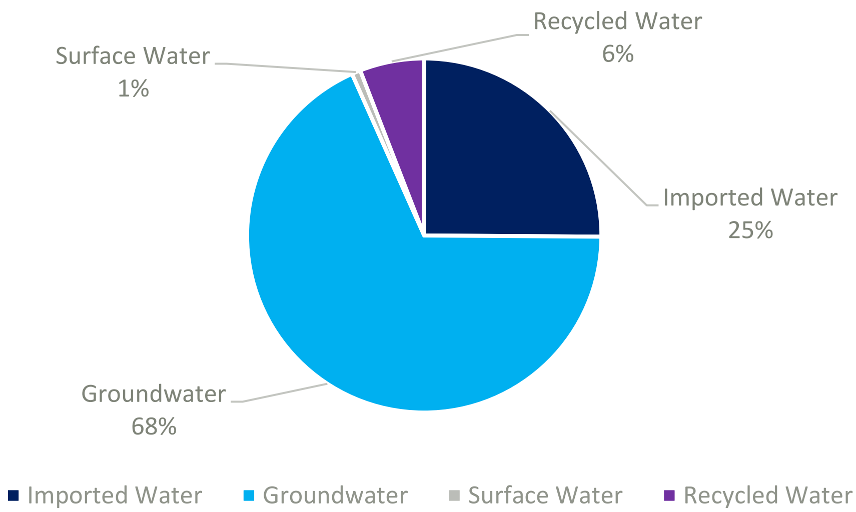
4.1.6 Regional Water Sources Summary

Each water agency in the region uses a unique mix of supplies and not all supply comes from Western Wholesale. An overview of the water sources used by each agency within Western's service area is shown in Table 4-1. Based on the historical water use for each of Western's retail agencies from 2017-2019, almost half of Western's retail agencies rely on imported water as a major supply source, but local groundwater is the largest source of supply for the region, as shown in Figure 4-2.

Table 4-1. Current Water Sources by Agency

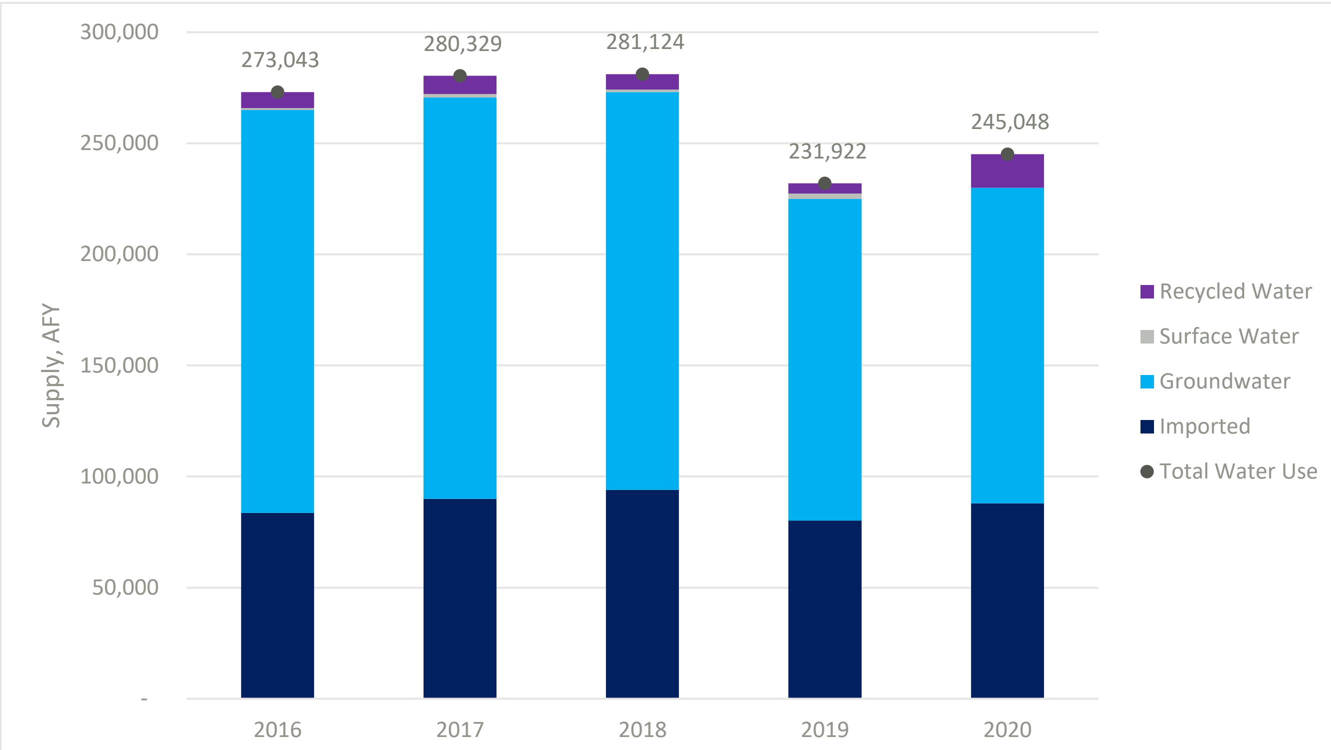
Agency	Imported Water	Groundwater	Surface Water	Recycled Water
Western Wholesale	X	X		
Western Retail	X	X		X
Box Springs Mutual Water District	X	X		
City of Corona	X	X		X
City of Norco	X	X		X
Eagle Valley Mutual Water Company	X	X		
Elsinore Valley Municipal Water District	X	X	X	X
Home Gardens County Water District		X		X
Jurupa Community Services District		X		X
Rancho California Water District	X	X		X
Riverside Highlands Water Company		X		
Riverside Public Utilities	X	X		X
Rubidoux Community Services District	X	X		
Santa Ana River Water Company		X		
Temescal Valley Water District	X	X		X

Figure 4-2. Percent Regional Water Use by Source



Total water use within Western's service area has ranged from approximately 230,000 AF to more than 280,000 AF in the last five years, including Western Retail. In 2020, approximately 36% of the total water used within Western's service area was provided by Western Wholesale.

Figure 4-3. 2016-2020 Regional Water Use by Source, AFY



4.2 Western Wholesale Supply

To meet the supplemental supply needs of their wholesale customers, Western Wholesale uses desalinated local groundwater and imported water from Metropolitan.

On overview of the sources of supply and key infrastructure for both Western Wholesale and Western Retail is shown on the following page.

Where Western's Water Comes From

Western has a diverse supply portfolio used to meet wholesale and retail demands, including imported water, local groundwater and recycled water. Western has made significant investments in local water supplies to reduce reliance on imported water, increase reliability and reduce costs. A robust network of infrastructure provides flexibility to route supplies to various locations, providing additional reliability to Western's wholesale and retail customers.

Supplies and Infrastructure

1 Arlington Desalter and Victoria Recharge Basin
Produces drinking water by treating local non-potable groundwater using reverse osmosis to remove salt and other matter. This process also helps clean up the groundwater basin and improve the quality over time. The new Victoria Recharge Basin captures stormwater from precipitation and runoff and percolates into the groundwater basin where it is later used by the Arlington Desalter, increasing local supply reliability.

2 Chino Desalter
Western partners with several other water agencies to treat local non-potable groundwater using reverse osmosis to create a new high quality drinking water supply.

3 Sterling Pump Station and La Sierra Pipeline
The recently completed Sterling pump Station and La Sierra Pipeline connect the Chino and Arlington Desalters to and allow Western to deliver both water sources to many different locations, increasing regional reliability.

4 San Bernardino Basin (SBBA)
Western owns rights to pump local potable groundwater from the SBBA and has a long term lease with Meeks & Daley Water Company to use additional water from the SBBA.

5 City of Riverside
Western has an agreement with Riverside to purchase their surplus local groundwater. Riverside also pumps and delivers Western's water from the SBBA to Western Retail at interconnections using their existing facilities.

6 Temecula Valley Groundwater
Western has rights to produce water from this basin for service to Western's Murrieta Retail system.

7 Recycled Water a Local Drought Proof Supply
Western provides recycled water and non-potable groundwater to meet non-potable irrigation water needs, preserving the potable supplies for domestic use.

8 Imported Water
Western Wholesale obtains potable and nonpotable imported water supply from the SWP and CRA through Metropolitan at various locations and delivers it to Western Retail and other wholesale customers in their service area. Some Western Wholesale customers receive raw imported water directly from Metropolitan pipelines and use the water for groundwater recharge or treat it at their own treatment plants for potable use.

9 Mills and Skinner Water Treatment Plants (WTP)
Metropolitan treats imported water at their Mills and Skinner WTPs and provides potable imported water to Western to distribute to Western Retail and other wholesale customers.

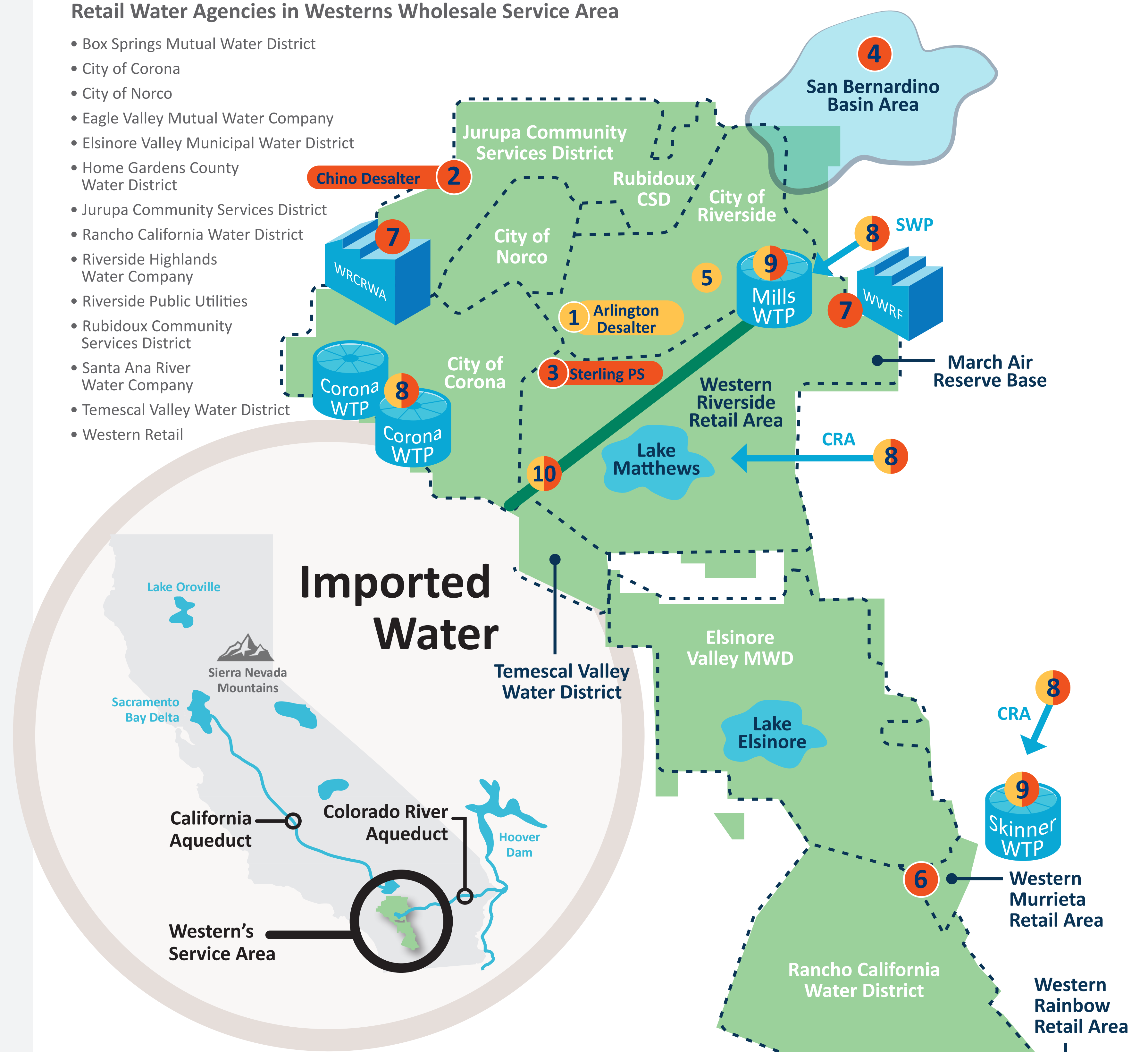
10 Mills Gravity Line
Deliver treated imported water from the Mills WTP to Western Retail and several Western Wholesale customers.

Wholesale | Retail | Wholesale & Retail

CRA - Colorado River Aqueduct | SWP - State Water Project

Retail Water Agencies in Westerns Wholesale Service Area

- Box Springs Mutual Water District
- City of Corona
- City of Norco
- Eagle Valley Mutual Water Company
- Elsinore Valley Municipal Water District
- Home Gardens County Water District
- Jurupa Community Services District
- Rancho California Water District
- Riverside Highlands Water Company
- Riverside Public Utilities
- Rubidoux Community Services District
- Santa Ana River Water Company
- Temescal Valley Water District
- Western Retail



Diversified Supplies Improve Reliability

Western is a member agency of Metropolitan Water District (Metropolitan) and obtains imported water from Northern California and the Colorado River to provide supplemental supplies within its service area. Imported water is an important part of Western's supply portfolio but is more costly and more prone to interruptions than local supplies due to the long distance it must travel to reach the region and other factors. Western has focused on diversifying its water supply to reduce reliance on imported water by developing local supplies.

4.2.1 Purchased and Imported Water

Western Wholesale's primary supply is imported water from Metropolitan. Approximately 75 percent of the wholesale supply was obtained from Metropolitan in 2020.

Metropolitan was formed in 1928 to develop, store, and distribute water for domestic and municipal purposes to the residents of Southern California. Today, the Metropolitan service area stretches across the Southern California coastal plain, serves 26 member agencies, and includes portions of Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties.

Metropolitan is a wholesale water provider and has no retail customers. It provides treated and untreated water directly to its member agencies. Over the last ten years, Metropolitan has provided between 50 % and 60 % of the municipal, industrial, and agricultural water used in its nearly 5,200-square mile service area. The remaining water is provided through local resources and other sources of imported water.

Western is one of the 26 member agencies that make up Metropolitan, which include 14 cities, 10 other municipal water districts and one county water authority. Western, like other member agencies, receives deliveries at different points in the system and pays for the service through a rate structure made up of multiple components. Each year, member agencies advise Metropolitan of how much water they anticipate they will need during the next five years. Metropolitan then works with member agencies to develop forecasts of long-term future water supply.

Metropolitan delivers supply to member agencies from two sources, the Colorado River Aqueduct (CRA), which it owns and operates, and the State Water Project (SWP), owned and operated by DWR. The supply mix varies depending on the availability of SWP supplies, which varies every year, much more significantly than the Colorado River supply. During the recent drought, water allocations from SWP were significantly reduced, leading to a greater proportion of Colorado River supplies in Metropolitan's supply mix. Additional information about Metropolitan is provided in Metropolitan' 2020 UWMP.

Western Wholesale receives treated imported water from Metropolitan's Mills Water Treatment Plant (WTP) and Skinner WTP, in addition to raw water which is delivered directly to wholesale customers from various connections to Metropolitan's system. Western Wholesale also owns and operates the Mills Gravity Line, which distributes treated water from the Mills WTP to the Western Retail Riverside system and several other wholesale customers.

Western has a ten-year purchase agreement with Metropolitan for a Tier 1 annual maximum of 105,783 AFY with a minimum Purchase Order Commitment for 70,522 AFY, effective January 1, 2015 to December 31, 2024. Western can purchase additional water beyond the purchase agreement maximum at Metropolitan's higher Tier 2 rate. A copy of the Purchase Order Commitment is provided in **Appendix G**. Western plans to renew the purchase order agreement in the future and the annual maximum and minimum will be revised as needed to meet anticipated use at that time.

Metropolitan does not provide supply projections for each member agency. Instead, Metropolitan uses a regional approach to developing projections. Metropolitan calculates the demand for the entire region, as discussed in its UWMP. Using information about existing and proposed local projects, Metropolitan then determines the amount of imported water supply and demand. Throughout the preparation of the 2020 UWMP, Western has provided information about local supply and projects and population projections to Metropolitan. Based on this information and information provided by other member agencies, Metropolitan has determined it is able to meet the demands of all member agencies through 2045, with significant surplus supplies.

4.2.2 Groundwater

Western extracts groundwater from the Riverside-Arlington basin and operates the Arlington Desalter, a reverse-osmosis groundwater treatment facility. The estimated supply available from the Arlington Desalter is approximately 5,000 AFY. The Arlington Desalter provides a local source of potable water for Western wholesale customers.

4.2.2.1 Riverside-Arlington Basin

The Riverside-Arlington Basin (classified as subbasin in DWR's Bulletin 118: DWR 8-02.03) underlies part of the Santa Ana River Valley in northwest Riverside County and southwest San Bernardino County, and stores water in alluvial deposits. The subbasin is part of the Upper Santa Ana Valley Groundwater Basin (DWR 8-02). It is bordered by the Box Springs Mountains on the southeast, Arlington Mountain on the south, La Sierra Heights and Mount Rubidoux on the northwest, and the Jurupa Mountains on the north. It is also bordered by the Rialto-Colton fault to the northeast, and a groundwater divide beneath the community of Bloomington along a portion of its northern boundary. The Riverside-Arlington Basin is replenished by infiltration from Santa Ana River flow (in the northern portion of the subbasin), underflow past the Rialto-Colton fault, intermittent underflow from the Chino subbasin, return irrigation flow, and deep percolation of precipitation.

Within the Riverside-Arlington Basin lies a subbasin called the Arlington Groundwater Basin, which is a shallow, alluvial-filled valley. Groundwater quality in the Arlington Subbasin has historically been degraded by elevated concentrations of TDS, nitrate, and other contaminants from industrial sources. To utilize Arlington Basin groundwater, Western operates the Arlington Desalter, a reverse-osmosis groundwater treatment facility that began operation in 1990. The Arlington Desalter is located at the western (down-gradient) end of the Arlington Basin, along with five nearby production wells. The Arlington Desalter serves two purposes, providing a local source of potable water and decreasing subsurface outflow of low-quality groundwater to the Temescal Basin. The capacity was recently expanded to provide additional potable supply.

The Arlington Basin is not adjudicated. Western has adopted the Arlington Basin Groundwater Management Plan (Western, 2012), which includes actions to mitigate overdraft and replenish groundwater levels, as well as protect and improve groundwater quality. The Riverside-Arlington Subbasin Groundwater Sustainability Agency (GSA) is currently developing a Groundwater Sustainability Plan (GSP). The GSP will develop water budgets, assess groundwater storage, develop sustainable management criteria, undesirable results, and minimum thresholds to protect the basin for future supply. The GSP also considers how the Riverside-Arlington subbasin interacts with adjacent basins in the area. The ongoing GSP will result in a plan and identify projects needed to ensure future sustainability of supplies from this basin.

The historic production from Arlington Desalter from 2016 to 2020 is shown in **Table 4-2**.

Table 4-2. DWR 6-1W Groundwater Volume Pumped, AFY

All or part of the groundwater described below is desalinated.

GROUNDWATER TYPE	LOCATION OR BASIN NAME	2016	2017	2018	2019	2020
Alluvial Basin	Riverside-Arlington	4,880	4,754	5,433	4,449	4,500
	TOTAL:	**4,880**	**4,754**	**5,433**	**4,449**	**4,500**

The City of Norco is the primary user of Arlington Desalter as a supply source, but water can also be delivered to the City of Corona or Jurupa Community Services District. The City of Corona has purchased water from the Arlington Desalter in the past and may do so again in the future.

Victoria Recharge Basin

In 2019, Western completed construction of the Victoria Recharge Basin near the intersection of Victoria Avenue and Jackson Street in Riverside (Victoria site). This site will be used to replenish the Riverside-Arlington groundwater basin with up to 1,800 acre-feet of water per year. The project benefits include:

- The Victoria Recharge Basin increases groundwater storage through the capture and recharge of stormwater that would otherwise be lost.
- The project improves groundwater quality and water management of the Arlington Basin, increasing the groundwater supply enabling the Arlington Desalter to operate at capacity.
- The project will provide a local water source to help decrease the region's reliance on imported water from Northern California.
- Locally-sourced water provides system reliability in the event of imported water disruption.

At this time, there are no other recharge sites planned; however, Western continues to explore additional recharge sites to continue to increase local supply reliability.

Victoria Recharge Basin

4.2.3 Surface Water

Western does not utilize any local surface water sources for their wholesale system. However, Western is a partner in developing stormwater recharge projects to supplement local supplies as described in **Section 4.1.5**.

4.2.4 Wastewater and Recycled Water

Western's recycled water sources are discussed in **Section 4.1.3**. Western Retail uses the recycled water produced at the Western WRF and is entitled to its portion of the recycled water produced at WRCWRA but does not have infrastructure in place to use the recycled water. Recycled water supplies for Western Retail are discussed in **Chapter 9**.

Recycled Water Coordination

Western Wholesale does not currently use recycled water to meet wholesale customer demands but is coordinating with other regional agencies to evaluate opportunities for future use of recycled water from WRCWRA.

4.2.5 Water Exchanges and Transfers

Western Wholesale does not currently have any exchanges or transfers with other water agencies.

Emergency Interties

Western has interties with Eastern and EVMWD for mutual aid and as an emergency supply source. Western also has interconnections with the cities of Riverside and Corona.

4.2.6 Future Water Projects

4.2.6.1 Santa Ana River Conservation and Conjunctive Use Program (SARCCUP)

The five regional water agencies in the Santa Ana River Watershed have identified a watershed scale project, the Santa Ana River Conservation and Conjunctive Use Program (SARCCUP), a cooperative program between Metropolitan, Western and other agencies in the Santa Ana Watershed to store imported water during wet years for use during dry years.

The group includes representatives from the following regional water agencies:

- Western Municipal Water District
- Eastern
- Inland Empire Utilities Agency (IEUA)
- Orange County Water District
- San Bernardino Valley Municipal Water District

The program goals of SARCCUP include:

- Providing watershed-wide benefits based upon regional collaboration
- Creating significant new dry-year yield

- Increasing the resiliency and reliability of the water supply

The SARCCUP includes four separate groundwater banks located in different groundwater basins within the Santa Ana Watershed. The total storage proposed for SARCCUP is about 137,000 acre-feet (AF). Each of the banks is expected to be able to recharge and extract one-third of its storage capacity in any year. The combined extraction capacity is 45,667 AFY. Because the participants are sharing the benefits equally, each agency receives 25% (1/4) of the total capacity (IEUA does not currently have any storage capacity), resulting in each of the SARCCUP agencies receiving 11,417 AFY of new dry-year yield. This may require transfers, in lieu, or exchanges between the agencies in both wet and dry years.

Western's SARCCUP facilities include the Sterling Pump Station and La Sierra Pipeline, Cannon Campbell Pump Station, Riverside-Arlington Well and Transmission Main and Elsinore Wells.

In early 2016, SAWPA was formally notified that it had been awarded $64,268,000 by DWR for its Proposition 84 2015 IRWM grant proposal, which included the SARCCUP. From the grant, SAWPA governance designated $55 million for SARCCUP implementation. The SARCCUP Proposition 84 grant award includes the development of a Decision Support Model which was used to help refine the proposed facilities and that identified additional facilities that could be included in future phases of the program. The total cost of Phase 1 of the SARCCUP program is approximately $150 million.

Construction of the SARCCUP facilities is ongoing and is estimated to be complete by 2023. The SARCCUP agencies will continue work to finalize all of the individual agreements needed for operations of the facilities and water purchases. This includes an agreement between the SARCCUP agencies and Metropolitan to allow the purchase of water made available under the program and special conditions associated with use of the water during droughts and emergencies.

4.2.7 Summary of Existing and Planned Sources of Water

Western plans to continue to provide water from the Arlington Desalter and imported water from Metropolitan to meet the demands of its wholesale customers. Western continues to evaluate additional local projects to decrease dependence on imported water and increase regional reliability. The total volume of water supplied from various sources in 2020 is summarized in **Table 4-3**.

Table 4-3. Actual Water Supplies

SUPPLY SOURCE	2020 VOLUME, AFY
POTABLE	**49,774**
Metropolitan Imported Treated Water	44,961
Arlington Desalter	4,814
NON-POTABLE	**25,151**
Metropolitan Untreated Water	25,151
TOTAL	**74,925**

Western plans to continue prioritizing use of the local groundwater supply from the Arlington Desalter.

According to the information provided in Metropolitan's 2020 UWMP, Metropolitan has determined that they can meet all demands in normal, dry, and multiple dry years with existing supplies and storage. Metropolitan's UWMP also shows significant excess supply available under all conditions so additional water is available if needed. More detail can be found in Metropolitan's 2020 UWMP.

Western will only purchase imported supplies as needed to meet demands. Therefore, projected imported water supplies are equal to projected imported water demands, less the supply from the Arlington Desalter. Additional imported water is available from Metropolitan if needed. Western Wholesale projected supplies are shown in **Table 4-4**.

Table 4-4. Projected Water Supplies, AFY

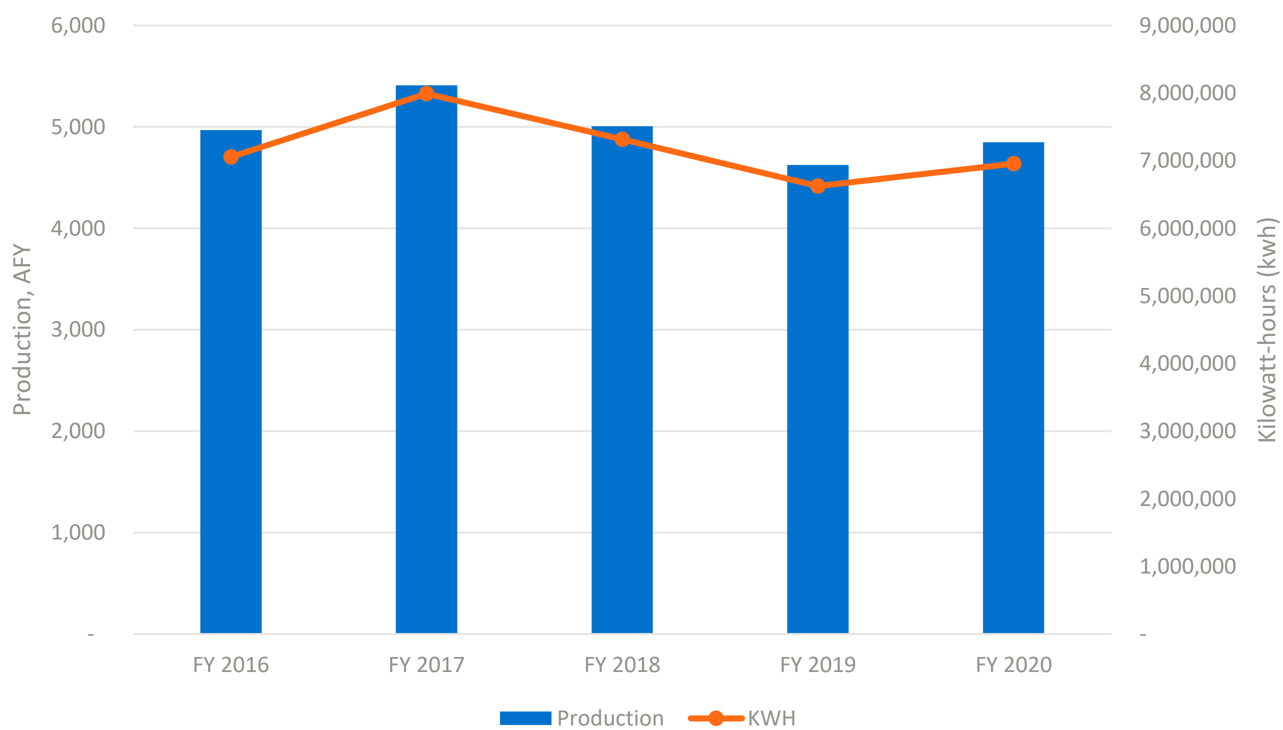
SUPPLY SOURCE	2025	2030	2035	2040	2045
Metropolitan Imported Water[1]	91,816	95,908	101,261	107,664	116,443
Arlington Desalter	5,000	5,000	5,000	5,000	5,000
TOTAL	**96,816**	**100,908**	**106,261**	**112,664**	**121,443**

[1]Metropolitan imported water may serve both potable and non-potable demands.

4.2.8 Energy Intensity

Western monitors energy usage at the Arlington Desalter. On average, Western uses 1,445 kilowatt-hours (kwh) for every AF of water produced (1,445 kwh/AF) from the Arlington Desalter. Energy usage includes pumping from the various Arlington Desalter wells and desalter treatment. A summary of energy used for production in 2016 through 2020 is provided in **Figure 4-4**.

Figure 4-4. Past Energy Used at the Arlington Desalter



5 WESTERN MUNICIPAL WATER DISTRICT
Wholesale Water Use Characterization

This chapter describes Western's historical, current, and projected wholesale water uses. Wholesale water use projections were developed by Western's wholesale customers and provided to Western for inclusion in the 2020 UWMP.

Western provides both potable and non-potable wholesale water to the region within their service area. Western's wholesale supplies are described in **Chapter 4**.

IN THIS SECTION

- Wholesale Customers
- Past, Current, and Projected Water Use

Colorado River Aqueduct

5.1 Western Wholesale Customers

In total, there are fourteen (14) retail water agencies within Western's wholesale service area, including Western Retail, that currently receive or can receive water from Western. Eight of the agencies received either local or imported wholesale water from Western in 2020 and an additional three are planning for future wholesale water supplies from Western, if needed. In addition to wholesale water purchased from Western, most of the water purveyors also deliver local surface and groundwater and/or recycled water within their respective service areas and some rely solely on local water supplies. Regional supplies are briefly discussed in **Chapter 4**.

Table 5-1 shows which retail agencies are current Western Wholesale customers and which are planning to obtain wholesale water from Western in the future.

Table 5-1. Current and Future Wholesale Customers

RETAIL AGENCY	CURRENT WESTERN WHOLESALE CUSTOMER	POTENTIAL FUTURE WESTERN WHOLESALE CUSTOMER
Box Springs Mutual Water Company (BSMWC)	✓	
City of Corona	✓	
City of Norco	✓	
Eagle Valley Mutual Water Company (Eagle Valley MWC)	✓	
Elsinore Valley Municipal Water District (EVMWD)	✓	
Home Gardens County Water District (HGCWD)		
Jurupa Community Services District (JCSD)		✓
Rancho California Water District (RCWD)	✓	
Riverside Highland Water Company (RHWC)		✓
Riverside Public Utilities		✓
Rubidoux Community Services District (RCSD)		✓
Santa Ana River Water Company (SARWC)		
Temescal Valley Water District (TVWD)	✓	
Western Retail	✓	

5.2 Past and Current Wholesale Water Use

A summary of past deliveries to Western Wholesale customers is provided in **Table 5-2**. Total deliveries varied from 2016 to 2019, which was likely driven primarily by local weather conditions. In 2019, the region received above average rainfall, which reduced outdoor water use.

Table 5-2. Western's Wholesale Historical and Current Water Use by Customer, AFY

WHOLESALE CUSTOMER	2016	2017	2018	2019	2020
Box Springs Mutual Water Company	80	84	120	121	149
City of Corona	15,616	18,693	17,606	15,280	17,866
City of Norco	4,578	4,096	4,933	4,449	4,814
Eagle Valley Mutual Water Company	75	71	90	108	132
Elsinore Valley Municipal Water District	15,945	16,337	19,671	14,531	15,115
Rancho California Water District	18,550	21,603	18,431	16,923	17,449
Temescal Valley Water District	3,019	3,205	3,205	3,083	3,435
Western Retail	14,558	15,366	16,852	14,359	15,967
TOTAL	**72,421**	**79,455**	**80,907**	**68,854**	**74,925**

For 2020, the potable and non-potable uses by customer are summarized in **Table 5-3**.

Table 5-3. 2020 Wholesale Water Use, AFY

WHOLESALE CUSTOMER	2020 USE
POTABLE	
Box Springs Mutual Water Company	149
City of Corona	1,229
City of Norco	4,814
Elsinore Valley Municipal Water District	15,115
Rancho California Water District	10,886
Temescal Valley Water District	3,435
Western Retail	14,148
TOTAL POTABLE	**49,774**
NON-POTABLE	
City of Corona	16,637
Eagle Valley Mutual Water Company	132
Rancho California Water District	6,563
Western Retail	1,819
TOTAL NON-POTABLE	**25,151**
TOTAL DEMAND	**74,925**

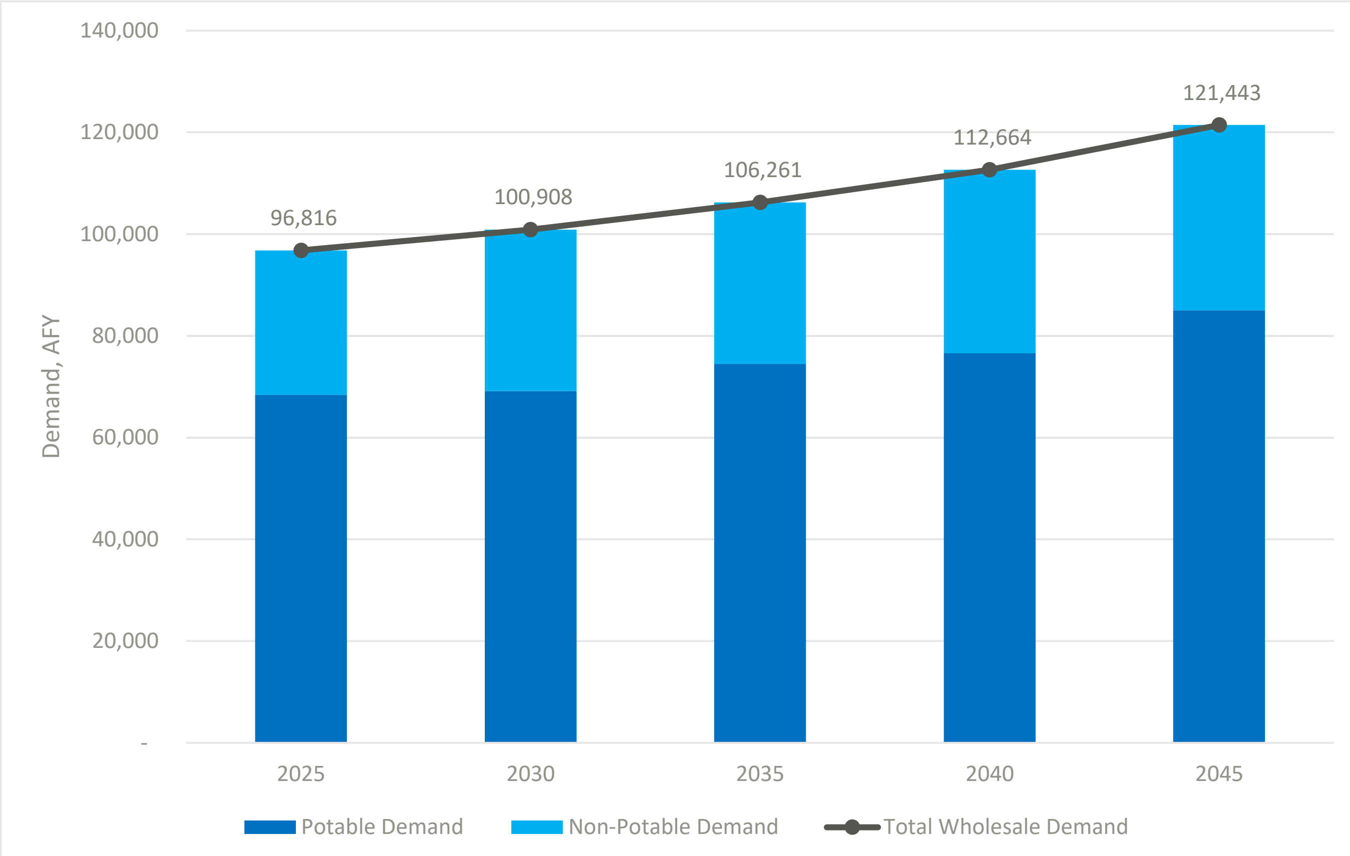
5.3 Projected Water Use

In preparation of this UWMP, Western coordinated with their wholesale customers to obtain the most recent planning projections and maintain consistency with the projections that will be shown in retail agency 2020 UWMPs. Based on input from the retail agencies, the expected water use for Western Wholesale for the next 25 years is summarized below in **Table 5-4** and **Figure 5-1**.

Table 5-4. Projected Wholesale System Demand, AFY

WHOLESALE CUSTOMER	2025	2030	2035	2040	2045
POTABLE					
Box Springs Mutual Water Company	145	150	175	175	175
City of Corona	1,838	1,838	1,838	1,838	1,838
City of Norco	250	250	250	250	250
Elsinore Valley Municipal Water District	18,000	16,605	18,338	20,073	21,925
Jurupa Community Services District	10,000	10,000	10,000	10,000	10,000
Rancho California Water District	16,593	12,240	12,848	9,289	10,088
Riverside Public Utilities	2,000	3,000	3,000	3,000	3,000
Rubidoux Community Services District	1,200	2,000	2,000	2,000	2,000
Temescal Valley Water District	3,720	3,800	3,800	3,800	3,800
Western Retail	14,680	19,306	22,293	26,181	31,928
TOTAL POTABLE	**68,426**	**69,189**	**74,542**	**76,606**	**85,004**
NON-POTABLE					
City of Corona	13,323	13,323	13,323	13,323	13,323
Eagle Valley Mutual Water Company	110	110	110	110	110
Elsinore Valley Municipal Water District	0	3,700	3,700	3,700	3,700
Rancho California Water District	13,286	13,286	13,286	17,625	17,625
Western Retail	1,671	1,300	1,300	1,300	1,681
TOTAL NON-POTABLE	**28,390**	**31,719**	**31,719**	**36,058**	**36,439**
TOTAL DEMAND	**96,816**	**100,908**	**106,261**	**112,664**	**121,443**

Figure 5-1. Projected Wholesale Demand, AFY



5.3.1 Characteristic Five-Year Water Use

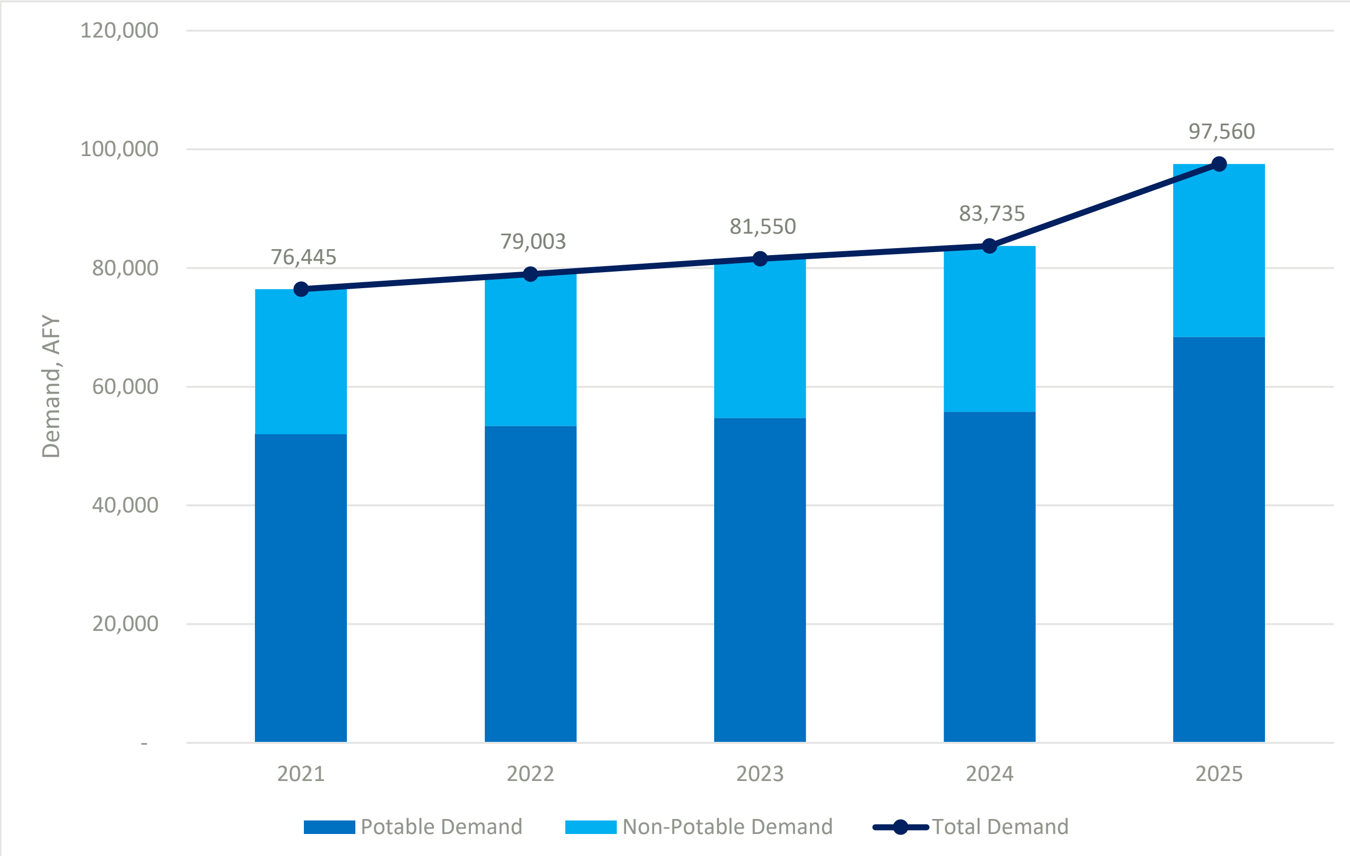
In addition to past and projected uses, the UWMP more closely analyzes anticipated conditions for the next five years (2021 – 2025). Demands for the next five years are provided in **Table 5-5** and **Figure 5-2**. The demand projections established in this chapter assume typical, unconstrained demand, free from other influential factors like conservation mandates.

Details on analysis for the next five years are discussed in **Chapter 6**.

Table 5-5. Projected Wholesale System Demand for the Next Five Years (2021-2025), AFY

WHOLESALE CUSTOMER	2021	2022	2023	2024	2025
POTABLE					
Box Springs Mutual Water Company	125	130	135	140	145
City of Corona	1,838	1,838	1,838	1,838	1,838
City of Norco	250	250	250	250	250
Elsinore Valley Municipal Water District	16,776	17,952	18,733	19,149	18,000
Jurupa Community Services District	0	0	0	0	10,000
Rancho California Water District	15,453	15,453	15,833	16,213	16,593
Riverside Public Utilities	0	0	0	0	2,000
Rubidoux Community Services District	0	0	0	0	1,200
Temescal Valley Water District	3,320	3,420	3,520	3,620	3,720
Western Retail	14,253	14,359	14,465	14,472	14,680
TOTAL POTABLE	**52,015**	**53,401**	**54,774**	**55,782**	**68,426**
NON-POTABLE					
City of Corona	13,323	13,323	13,323	13,323	13,323
Eagle Valley Mutual Water Company	110	110	110	110	110
Rancho California Water District	9,105	10,150	11,195	12,241	13,286
Western Retail	1,893	2,018	2,147	2,280	2,415
TOTAL NON-POTABLE	**24,431**	**25,601**	**26,775**	**27,954**	**29,134**
TOTAL DEMAND	**76,445**	**79,003**	**81,550**	**83,735**	**97,560**

Figure 5-2. Projected Wholesale Demand for the Next Five Years (2021-2025), AFY



6

WESTERN MUNICIPAL WATER DISTRICT

Wholesale Water Service Reliability and Drought Risk Assessment

This section describes the reliability of Western's wholesale water supplies, which reflects Western's ability to meet the water needs of its customers with water supplies under varying conditions. The essential findings are that Western can reliably meet its wholesale demands with existing and future supply sources based on demand and supply projections.

IN THIS SECTION

- Supply Constraints
- Water Service Reliability Assessment
- Drought Risk Assessment

Every urban water supplier is required to assess the reliability of its water service to its retail agencies under normal, dry, and multiple-dry years for at least the next 20 years, and specifically assesses the drought risk over the next five years. There are various factors that may impact reliability of supplies such as legal, environmental, water quality, and climatic, which are discussed below. These factors can result in immediate (facility failures), near-term (SWP limitations), or long-term (climate change) impacts to reliability and must therefore be considered in future planning.

The impacts of these factors on reliability increase under single-dry and multiple-dry year hydrologic patterns. Western's work to expand and further diversify its supply portfolio is an important step toward improving the reliability of supplies. Western has also prepared a comprehensive Water Shortage Contingency Plan to provide reliability in the event of a water shortage, presented in **Appendix A**. Expected water supply reliability for normal, single dry year, and multiple-dry years through 2045 is discussed in this chapter followed a drought risk assessment for 2021 to 2025.

6.1 Constraints on Water Sources

Western's sources of wholesale supply are imported water purchased from Metropolitan and local groundwater treated at the Arlington Desalter. These two supply sources may be impacted by climatic and hydrologic conditions, water quality, and legal restrictions, as well as potential for interruption of supply driven by catastrophic events.

6.1.1 Imported Water Supply Reliability

The majority of Western's supplies are imported water purchased from Metropolitan, and as described below, Western's supply reliability analysis follows the analysis and data developed by Metropolitan as presented in Metropolitan's 2020 UWMP. Metropolitan described several challenges in providing adequate, reliable, and high-quality supplemental water supplies along with potential management measures in the Metropolitan 2020 UWMP.

Potential constraints to Metropolitan supplies and associated supply reliability include:

Drought

The water conditions that the region faced leading up to 2020 were characterized by alternating scarcity and abundance. While investments in storage and flexible operations have prepared Metropolitan to capitalize on available supplies in wet years and manage through drought years, drought challenges remain. The Colorado River Basin has historically experienced large swings in annual hydrologic conditions and has exhibited a drying trend over the last 21 years. Changes in this period have been mitigated by actions taken by Metropolitan in cooperation with the Bureau of Reclamation and the other Basin States to maintain system storage, avoiding a shortage declaration. At the close of 2020, however, system storage was at or near its lowest since 2000, so there is less water available to buffer future dry conditions. The Sacramento-San Joaquin Delta (Bay-Delta) has suffered reduced flows and rising temperatures and SWP supplies have been significantly reduced at times, with a record low allocation of 5 percent in 2014.

Environmental/Ecological Needs (Operational Constraints)

Sensitive species in the Bay-Delta system require base flows for survival; these flows are threatened by drought and other factors, reducing the volume of water available for pumping to the SWP. As species become further stressed, environmental demands on Bay-Delta water may increase. Operational constraints will likely continue until a long-term solution to the problems in the Bay-Delta is identified and implemented.

Climate Change

Climate change is anticipated to increase the frequency and intensity of droughts and flooding, reduce Sierra Nevada snowpack, change runoff pattern and amount, raise average temperatures, and raise sea levels. These effects may reduce the availability of supplies in the Bay-Delta and Colorado River systems. Sea level rise poses a significant challenge to the salt balance in the Bay-Delta and could result in pumping restrictions. Sea level rise also increases the vulnerability of the Bay-Delta supply to seismic events.

Threats to Infrastructure

Metropolitan's imported supplies must travel across large distances to reach turnouts where local agencies are able to access the water. California is a seismically active state and prone to wildfires, which could damage imported water infrastructure anywhere along the SWP or Colorado River Aqueduct in such a manner as to disrupt supply availability. California is also a large state with a large economy, housing some major industries and defense installations. This makes it a potential target for acts of terrorism, including potential threats to its water supplies and infrastructure.

Water Quality

Water quality challenges, such as salinity, algae toxins, disinfection byproduct precursors, nutrients, and the identification of constituents of emerging concern, have the potential to impact imported water supplies. To date, Metropolitan has not identified any water quality risks that cannot be mitigated. Salinity, particularly Colorado River supplies, is a significant issue, but Metropolitan anticipates the only constraint will be the need to blend Colorado River water with SWP supplies to meet salinity needs.

Metropolitan's 2020 UWMP describes a variety of past and ongoing actions to address these water supply challenges to maintain water reliability within its service area.

Metropolitan's proactive measures include:

Continuing Water Conservation

Metropolitan supports financial incentives, education, outreach programs and appliance/plumbing standards at both the regional and local level. Metropolitan also works with member and local agencies, including Western, to help identify opportunities and procure grant funding for conservation programs.

Increasing Local Resources

Since 1982, Metropolitan has assisted local agencies in the development of water recycling and groundwater recovery under the Local Resources Program (LRP). The LRP program has been expanded to provide incentives for on-site recycled water retrofit costs and development of other water resources including seawater desalination and stormwater.

Augmenting Water Supplies

Augmenting water supplies through water transfers and exchanges is an element of Metropolitan's Integrated Resources Plan (IRP) to mitigate water shortages during dry periods.

Increasing Storage Programs

Metropolitan has a number of storage programs with water agencies along the California Aqueduct that would allow it to store SWP supplies during surplus conditions and to have stored water returned when needed. Metropolitan has invested in infrastructure to allow more effective use of stored water when needed and has also developed additional storage programs.

Modifying Metropolitan's Distribution System

Driven by the historic low SWP allocation in 2014, Metropolitan and several member agencies have made operational and system modifications to enhance operational flexibility and efficient delivery of Colorado River, SWP, and in-region supplies within Metropolitan's service area. Within Western's service area, the Inland Feeder-Lakeview Pipeline Intertie, which was completed in 2016 and allows for delivery of water from Diamond Valley Lake to Mills WTP, increases Western's imported water supply reliability. This intertie enables the Mills WTP to withstand an extended interruption of supplies from the California Aqueduct East Branch. The intertie also provides delivery flexibility to handle any required repairs by DWR to the Santa Ana Valley Pipeline north segment.

Implementing Shortage Response Actions (when needed)

Metropolitan developed a Water Shortage Contingency Plan (WSCP) to be consistent with elements of the existing Metropolitan Water Surplus and Drought Management Plan (WSDM) and Water Supply Allocation Plan (WSAP). If needed, Metropolitan will implement shortage response actions to distribute limited imported supplies and preserve storage reserves.

Pursuing Long-term Solutions in the Bay-Delta

Metropolitan adopted a Delta action plan in June 2007 that includes a long-term Delta Plan. The long-term action plan recognizes three basic elements that must be addressed: Delta ecosystem restoration, water supply conveyance, and flood control protection and storage development.

Maintaining Water Quality

Metropolitan responds to water quality concerns by protecting the quality of the source water, developing water management programs that maintain and enhance water quality, and changing water treatment protocols or blending.

Planning for Climate Change

In addition to many other activities related to climate change, Metropolitan is currently developing an updated 2020 Integrated Resources Plan (IRP), which recognizes risks and uncertainties from climate change and other sources. Metropolitan has established an intensive, comprehensive technical process to identify key vulnerabilities to regional reliability, including climate change. This Robust Decision Making (RDM) approach was used with both the 2015 and 2010 IRP Updates. This methodology can show how vulnerable the region's reliability is to longer-term risks such as climate change and can also establish "signposts" that can be monitored to see when critical changes may be happening.

To maintain a reliable source of imported water supply for its member agencies, Metropolitan has and will continue to contend with these considerable challenges. After learning from the droughts of 1977-78 and 1989-92, Metropolitan, in conjunction with its member agencies, instituted a resource planning process that is based on diversification of the region's water supply portfolio and continued efficient water use. This integrated resource planning process has recognized that only through a mix of imported and member agency local supplies, along with aggressive implementation of water conservation, can the Metropolitan service area attain overall reliability of water supply.

This integrated planning effort has resulted in the following documents:

1996, 2004, 2010, 2015, and 2020 Integrated Resources Plans (IRP)

Metropolitan's IRP process assessed potential future regional demand projections based upon anticipated population and economic growth as well as conservation potential. The IRP also includes regional supply strategies and implementation plans to better manage resources, meet anticipated demand, increase overall system reliability, and adapt to the effects of climate change. Metropolitan is currently preparing the 2020 IRP.

1999 Water Surplus and Drought Management Plan

The Water Surplus and Drought Management Plan provides the policy guidance to manage the region's water supplies by integrating the operating activities of supply surplus and shortage to achieve the reliability goals of the IRP.

Water Supply Allocation Plan

The Water Supply Allocation Plan, last updated in 2014, includes the specific formula for calculating member agency supply allocations and the key implementation elements needed for administering the allocation. The need for the Water Supply Allocation Plan arose after the 2008 Bay- Delta biological opinions and rulings that limited SWP supplies to its contractors including Metropolitan. The Water Supply Allocation Plan formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of Metropolitan supplies up to 50 percent.

All these planning documents recognize that the reliability of the Metropolitan service area is dependent on improving the reliability of imported supplies from the Colorado River and State Water Project as well as the successful implementation of future local supplies and conservation. This dependence on an integrated approach to water reliability and diversification of supplies has been the foundation of DWR's State Water Plan, through its last several updates and is the cornerstone of Governor Newsom's California Water Resilience Portfolio. Some of the most significant factors affecting reliability for imported water supplies include legal, environmental, water quality and climatic changes. Successful implementation of Metropolitan's UWMP is dependent on the continued successful implementation of local supply projects by local agencies, including Western and their wholesale customers.

6.1.2 Groundwater Supply Reliability

The reliability of Western's groundwater supply will be proactively managed by Western and its local partners through the Riverside-Arlington Subbasin Groundwater Sustainability Agency. Development of the GSP is ongoing and expected to be completed in 2021. The GSP will determine the sustainable water budget for the basin, accounting for the effects of climate change, develop sustainable management criteria, undesirable results, and minimum thresholds to evaluate groundwater conditions, and implement a monitoring network and identify supplemental projects to ensure the basin is reliable and can support demands throughout the future.

6.2 Water Service Reliability Assessment

This section presents Western's expected water supply reliability for a normal year, single dry year, and five consecutive dry years, including projections for 2025, 2030, 2035, 2040, and 2045.

The primary constraint on the available of water supplies has been in extreme drought conditions. As described above, Metropolitan has made substantial investments to increase imported water supply reliability during periods of extended drought. As a result, Metropolitan's 2020 UWMP projects the ability to meet all imported water demands under normal, single dry year, and multiple dry year conditions, with excess supplies.

Through implementation of the Arlington GSP, Western expects the Riverside-Arlington water supply to be stable and does not anticipate any reduction to supplies in dry years.

The basis of the reliability assessment is presented in this section.

6.2.1 Year Type Characterization

The water service reliability and Drought Risk Assessment analyze supply over several water years: normal, single dry, and multiple dry years. DWR defines these years as:

Normal Year

The normal year represents the water supplies a supplier considers available during normal conditions. Metropolitan uses an average from 1922 to 2017 to establish normal year supply availability. To remain consistent, Western utilizes the same period for analyzing imported water availability since majority of the wholesale system is supplied by imported Metropolitan water.

Single Dry Year

The single dry year is recommended to be the year that represents the lowest water supply available. Metropolitan has identified 1977 as the single driest year.

Five-consecutive Dry Year

The driest five-year historical sequence for the Supplier, which may be the lowest average water supply available for five years in a row. Metropolitan has identified 1988 through 1992 as the greatest 5-year drought period.

Table 6-1. DWR 7-1W Basis of Water Year Data (Reliability Assessment)

		AVAILABLE SUPPLY IF YEAR TYPE REPEATS
YEAR TYPE	BASE YEAR	PERCENT OF AVERAGE SUPPLY
Average Year	1922-2017	
Single-Dry Year	1977	99%
Consecutive Dry Years 1st Year	1988	100%
Consecutive Dry Years 2nd Year	1989	100%
Consecutive Dry Years 3rd Year	1990	100%
Consecutive Dry Years 4th Year	1991	100%
Consecutive Dry Years 5th Year	1992	100%

6.2.2 Water Service Reliability

Normal year supply and demand projections for the wholesale system were developed in **Chapter 4** and **Chapter 5** and form the basis of this reliability analysis. Western wholesale customers provided their own assumptions for demand changes during single and multiple dry years, which are incorporated into this analysis.

Western obtains both Potable and Non-Potable imported water from Metropolitan. For this analysis, it was assumed that non-potable supplies were equal to non-potable demands and potable supplies were equal to potable demands. However, it is important to note that Western is not limited to a particular volume of imported water and that Metropolitan's 2020 UWMP shows a substantial surplus of supplies under all conditions. Metropolitan has made substantial investments in storage projects to ensure reliability in dry years. Therefore, Western expects to have access to additional imported water supplies, if needed.

Results of the reliability analysis for normal, single dry, and 5-consecutive dry years are shown in the following sections. This analysis applies only to Western Wholesale supplies. Other regional supplies that are used by Western's wholesale customers agencies are discussed in **Chapter 4**.

Water Service Reliability – Normal Year

Table 6-2. Normal Year Supply and Demand Comparison, AFY

	2025	2030	2035	2040	2045
POTABLE					
Supply	68,426	69,189	74,542	76,606	85,004
Demand	68,426	69,189	74,542	76,606	85,004
DIFFERENCE	**0**	**0**	**0**	**0**	**0**
NON-POTABLE					
Supply	28,390	31,719	31,719	36,058	36,439
Demand	28,390	31,719	31,719	36,058	36,439
DIFFERENCE	**0**	**0**	**0**	**0**	**0**

Water Service Reliability – Single Dry Year

Table 6-3. Single Dry Year Supply and Demand Comparison, AFY

	2025	2030	2035	2040	2045
POTABLE					
Supply	68,426	69,189	74,542	76,606	85,004
Demand	68,426	69,189	74,542	76,606	85,004
DIFFERENCE	**0**	**0**	**0**	**0**	**0**
NON-POTABLE					
Supply	28,390	31,719	31,719	36,058	36,439
Demand	28,390	31,719	31,719	36,058	36,439
DIFFERENCE	**0**	**0**	**0**	**0**	**0**

Water Service Reliability – Five Consecutive Dry Year

Table 6-4. Multiple Dry Year Supply and Demand Comparison, AFY

		2025	2030	2035	2040	2045
FIRST YEAR	POTABLE					
	Supply	68,426	69,189	74,542	76,606	85,004
	Demand	68,426	69,189	74,542	76,606	85,004
	DIFFERENCE	0	0	0	0	0
	NON-POTABLE					
	Supply	28,390	31,719	31,719	36,058	36,439
	Demand	28,390	31,719	31,719	36,058	36,439
	DIFFERENCE	0	0	0	0	0
SECOND YEAR	POTABLE					
	Supply	68,426	69,189	74,542	76,606	85,004
	Demand	68,426	69,189	74,542	76,606	85,004
	DIFFERENCE	0	0	0	0	0
	NON-POTABLE					
	Supply	28,390	31,719	31,719	36,058	36,439
	Demand	28,390	31,719	31,719	36,058	36,439
	DIFFERENCE	0	0	0	0	0
THIRD YEAR	POTABLE					
	Supply	68,426	69,189	74,542	76,606	85,004
	Demand	68,426	69,189	74,542	76,606	85,004
	DIFFERENCE	0	0	0	0	0
	NON-POTABLE					
	Supply	28,390	31,719	31,719	36,058	36,439
	Demand	28,390	31,719	31,719	36,058	36,439
	DIFFERENCE	0	0	0	0	0

*Continued on next page.

FOURTH YEAR	**POTABLE**					
	Supply	68,426	69,189	74,542	76,606	85,004
	Demand	68,426	69,189	74,542	76,606	85,004
	DIFFERENCE	**0**	**0**	**0**	**0**	**0**
	NON-POTABLE					
	Supply	28,390	31,719	31,719	36,058	36,439
	Demand	28,390	31,719	31,719	36,058	36,439
	DIFFERENCE	**0**	**0**	**0**	**0**	**0**
FIFTH YEAR	**POTABLE**					
	Supply	68,426	69,189	74,542	76,606	85,004
	Demand	68,426	69,189	74,542	76,606	85,004
	DIFFERENCE	**0**	**0**	**0**	**0**	**0**
	NON-POTABLE					
	Supply	28,390	31,719	31,719	36,058	36,439
	Demand	28,390	31,719	31,719	36,058	36,439
	DIFFERENCE	**0**	**0**	**0**	**0**	**0**

6.2.3 Description of Management Tools and Options

Most of the water supplied by Western's wholesale system is imported water from Metropolitan. As a member agency of Metropolitan, Western coordinates with Metropolitan through planning processes such as the 2020 IRP to ensure a consistent and reliable supply is available. In addition, Western continues to explore local projects to increase supply to the wholesale system and continues to promote conservation and educational programs to increase drought awareness and conservation actions throughout the region.

6.3 Drought Risk Assessment

The Drought Risk Assessment (DRA) is a new requirement to the UWMP that focuses analysis on the next five years (2021 - 2025). To estimate demands for 2021 through 2025, a straight-line interpolation was applied from the 2020 actual demand to the 2025 projected demand.

6.3.1 Data, Methods, and Basis for Water Shortage Condition

The data, methods, and basis for a water shortage condition were identified using typical normal year supply and demand, as developed in **Chapter 4** and **Chapter 5**.

The DRA provides a snapshot of the anticipated surplus or deficit if a drought were to occur in the next five years. If Western estimates a greater demand than supply available, estimated shortage response actions savings from the WSCP may be entered into the DRA. WSCP savings can fall under supply augmentation or demand reduction estimates that Western would expect to achieve during a water shortage.

The demands for the DRA's five-consecutive dry years were based on the normal demand. Normal year demands represent "unconstrained demand". Unconstrained demand is water demand absent any water supply restrictions. This exercise allows an agency to get an indication of the potential amount of conservation that may be required to reduce demands.

6.3.2 DRA Water Source Reliability

As described in Metropolitan's 2020 UWMP and DRA, Metropolitan's near-term assessment reveals that its supply capabilities are expected to exceed its projected water use for years 2022, 2024, and 2025. However, estimates of projected water supply and use reveals that there could be a possible shortfall of core supplies in 2021 and 2023. This shortfall is largely triggered by the assumed repeat of the historical 1988 and 1990 low supply conditions from the SWP to predict supply availability for 2021 and 2023. Actual supply conditions for 2021 and 2023 may prove different from historic supply conditions (Metropolitan Water District of Southern California, 2021).

Metropolitan's DRA illustrates its potential shortage response actions if such shortfall were to happen. As detailed in Metropolitan's 2020 UWMP (**Section 2.5** and **Appendix 4**), Metropolitan has in place a robust WSCP and comprehensive shortage response plan that includes demand reduction measures and supply augmentation actions. In Metropolitan's DRA, years 2021 and 2023 are estimated to have shortage levels within 10% of water use, corresponding to its WSCP Level 1 Shortage. Metropolitan has a range of response actions that it can take in a Level 1 Shortage, including take from Storage, execute Flexible Supplies, implement Voluntary Demand Reduction, and implement its Water Supply Allocation Plan. Metropolitan's DRA anticipates taking from its storage during these shortfall years to augment its supply and meet its demand. As of January 1, 2021, Metropolitan has 3.2 million AF in storage that may be used for dry-year needs within multiple reservoirs to mitigate any potential shortage in 2021 and 2023. In addition, Metropolitan may also take from its water banking programs in the Central Valley, draw from in-region conjunctive use programs, pursue additional supplies through SWP transfers, or exercise any combination of supply augmentation actions.

With a potential surplus estimated for years 2022, 2024, and 2025, no water service reliability concern is anticipated, and no shortfall mitigation measures are expected to be exercised. Metropolitan will periodically revisit its representation of both individual supply sources and of the gross water use estimated for each year and will revise its DRA if needed.

This DRA assumes that Western will be able to purchase sufficient supplies to meet demands based on the results of Metropolitan's DRA. As shown in **Table 6-5**, Western's supplies are anticipated to be reliable, and no supply shortfalls are expected from 2021 to 2025 when assuming the next five years are similar to the driest five years. Western does not anticipate the need to implement shortage response actions in its wholesale WSCP in the next five years, unless Metropolitan implements a WSAP, which is not expected based on Metropolitan's DRA analysis.

Table 6-5. Wholesale DRA Results, AFY

	2021	2022	2023	2024	2025
POTABLE					
Gross Water Use	52,015	53,401	54,774	55,782	68,426
Total Supply	52,015	53,401	54,774	55,782	68,426
DIFFERENCE	**0**	**0**	**0**	**0**	**0**
NON-POTABLE					
Gross Water Use	24,431	25,601	26,775	27,954	29,134
Total Supply	24,431	25,601	26,775	27,954	29,134
DIFFERENCE	**0**	**0**	**0**	**0**	**0**

7 WESTERN MUNICIPAL WATER DISTRICT
Wholesale Demand Management Measures

This chapter describes Western's implementation of wholesale demand management measures (DMMs) intended to promote water use efficiency in partnership with retail agencies to support sustainable management of regional water supplies.

Western has been a leader in water use efficiency for many years and actively collaborates with local and regional agencies and the communities it serves to implement innovative programs and drive reductions in water usage. Western staff also serves in a leadership role for the California Water Efficiency Partnership (CalWEP) whose mission is to maximize urban water efficiency and conservation throughout California by supporting and integrating innovative technologies and practices; encouraging effective public policies; advancing research, training, and public education; and building collaborative approaches and partnerships. Western leverages these partnerships, tools, and resources within their service area.

Details on Western's wholesale DMMs are provided in the following sections. DMMs implemented for Western Retail are described in **Chapter 12**.

IN THIS SECTION

- Metering
- Outreach and Public Education
- Water Conservation Program Coordination and Staffing
- Asset Management

7.1 Metering

All of Western's wholesale customers are fully metered and billed volumetrically each month.

Western has 14 wholesale agencies in its service area (see **Chapter 3**, System Description), eight of which received raw and treated water supplies from Western in 2020, served through 20 meters. Metropolitan owns and maintains all but three of these meters. Western's operations staff performs annual meter calibrations on all wholesale meters.

7.2 Outreach and Public Education

As a wholesaler, Western implements Public Education and Outreach programs within its general service area, described in more detail below.

7.2.1 Public Outreach

Western's Strategic Communications department provides extensive public outreach to the communities it serves, with at least quarterly contact. Water-use efficiency is promoted through press releases and events, paid advertising, bill inserts, customer newsletter, landscape water conservation media campaigns, website program brochures, speaker's bureau, and cooperative partnerships with other retail agencies and other area partners.

Western's outreach programs deliver the following key messages:

- Imported water supplies are unreliable at times;
- Demand for quality water has increased over time;
- Conservation efforts and efficient use are highly effective means to stretch and extend water resources; and
- Western has incentive programs and support mechanisms that will increase water efficiency and benefit customers.

In addition, Western has converted its office landscaping to drought-tolerant plants to encourage public acceptance, desire for, and use of water-efficient landscapes. The local chapter of the Master Gardeners of Riverside County also helps facilitate regular workshops to promote environmentally responsible and sustainable horticultural practices. Details on the Master Gardeners of Riverside County are provided in **Chapter 12**, Retail Demand Management Measures.

7.2.2 School Education Programs

Western sponsors a regional school education program in its general service area. Western has been a leader in the field of water education since 1982. Western partners with its retail water agencies to implement programs for schools throughout Western's general service area. Western's School Program is designed to encourage and assist educators as they teach students about water supply, distribution, reclamation, conservation, and the future of water supplies. The material and services offered meet the requirements of the California Science Framework Addendum and are provided at no charge to participating teachers, schools, and students, public and private. Western conducts class presentations and teacher workshops, and offers materials including student workbooks, water cycle bracelets, earth balls, water story rocks, assembly-related material, teachers' guides, videos, speakers, and field trips. Complete class water education units are also distributed. A total of

157 public schools are eligible to participate in Western's education program; 143 of these schools are located within Western's wholesale service area (exclusive of those schools in Western's retail service area).

Western has also established free, virtual tools to support teachers and engage students in response to the COVID-19 pandemic. The "Lighten Your Load" program provides water education support for teachers. Teachers can sign up for a one-on-one planning session with Western's water education experts and will receive individualized advice and access to resources for use within a virtual classroom environment while meeting the California State and Next Generation Standards. Western has also developed a new video game to help students learn about California's water system and Western's distribution system. The game's beta version debuted at the 2020 Science and Technology Education Partnership (STEP) Conference. This interactive game will help students learn about where their water comes from (Western Municipal Water District, 2020).

Since 1995, Western has offered programs to fund creative classroom projects that further a better understanding of water and the vital role it plays in the community. Western also offers grants for educators under the Lois B. Krieger Water Project Grants for Educators fund. Teachers within Western's general service area can apply to receive up to $1,000 in classroom funding for water education projects (both virtual and in-classroom). In 2020, 21 teachers received grant awards totaling more than $14,000 for projects pertaining to water quality testing, hydroponic gardening, and sensory water exploration. All teachers in Western's District, in both private and public schools in grades K–12, are eligible to apply for these grants.

Western also offers limited scholarships for students residing in its service area who are studying fields related to water (water policy, public administration and management, environmental geology, water management, water conservation) at local universities, including California State University San Bernardino, University of California Riverside, Riverside City College, and Norco College.

7.3 Water Conservation Program Coordination and Staffing

Western has maintained a full-time water conservation coordinator position since 1990. The water conservation coordinator implements wholesale and retail area programs.

7.4 Asset Management

Western maintains and implements upgrades to its distribution system, including facilities, equipment, and infrastructure, through regular operation and maintenance activities. Western's Operations Department implements maintenance and repairs of Western's system.

7.5 Wholesale Supplier Assistance Program

Western provides financial and technical assistance and helps build partnerships with its retail agencies to promote conservation. Western participates in Metropolitan's Member Agency Administered (MAA) funding for projects that are not included in Metropolitan's regular rebate program. Western receives $748,000 in every two-year Metropolitan budget cycle for conservation projects.

In the past, Western and its wholesale customers have used the MAA funding for the following projects:

- High-efficiency toilet installations
- High-efficiency sprinkler nozzle distributions
- Weather-based irrigation controller distributions
- Hot Water Recirculating Pump distributions
- Swimming pool cover rebates
- Utility-side Leak Detection equipment purchases
- Customer-side leak detection and flow monitoring rebates
- Analysis of customer-side leak detection devices
- Drinking water education programs
- Water-use-efficiency customer workshops
- Educational video game development
- Smart Irrigation equipment installation
- Multi-family toilet sensor installations
- Study of color-retention in warm season turf grasses with University of California Riverside
- Partnership with SoCalGas to install water saving devices

Western continues to promote conservation throughout their entire service area and supports their wholesale customers' conservation programs.

8

WESTERN MUNICIPAL WATER DISTRICT

Wholesale Water Shortage Contingency Plan

The WSCP is a strategic plan that Western uses to prepare for and respond to foreseeable and unforeseeable water shortages. This chapter provides an overview of the portions of Western's Water Shortage Contingency Plan that are applicable to Western Wholesale. The standalone Water Shortage Contingency Plan is included in Appendix A.

The California Water Code Section 10632 requires that every urban water supplier that serves more than 3,000 acre-feet per year or has more than 3,000 connections to prepare and adopt a standalone Water Shortage Contingency Plan (WSCP) as part of its UWMP. Western Wholesale and Western Retail are subject to the WSCP requirements and a single WSCP has been developed to meet the requirements for both systems. This chapter provides an overview of the portions of the WSCP that are applicable to Western Wholesale. **Chapter 13** provides an overview of the portions of the WSCP that are applicable to Western Retail. Western's WSCP is included as **Appendix A** and will be separately submitted to DWR by July 1, 2021. The WSCP is developed separately from Western's 2020 UWMP and can be amended, as needed, without amending the UWMP.

IN THIS SECTION

- WSCP Outline
- Wholesale WSCP Requirements Overview

The WSCP is a strategic plan that Western uses to prepare for and respond to foreseeable and unforeseeable water shortages. A water shortage occurs when water supply available is insufficient to meet the normally expected customer water use at a given point in time. A shortage may occur due to a number of reasons, such as water supply quality changes, climate change, drought, regional power outage, and catastrophic events (e.g., earthquake). Additionally, the State may declare a statewide drought emergency and mandate that water suppliers reduce demands, as occurred in 2014. The WSCP serves as the operating manual that Western will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages. The Western WSCP provides a process for an annual water supply and demand assessment for the wholesale system and structured steps designed to respond to actual conditions. This level of detailed planning and preparation provide accountability and predictability and will help Western maintain reliable supplies and reduce the impacts of any supply shortages and/or interruptions.

The WSCP must be updated based on new requirements every five years and will be adopted as a current update for submission to the California Department of Water Resources by July 1, 2021.

8.1 Water Shortage Contingency Plan Outline

Western's WSCP is organized into six sections:

- **Section 1** - Overview of the WCSP
- **Section 2** - Western Wholesale Water Shortage Contingency Plan
- **Section 3** - Western Retail Water Shortage Contingency Plan
- **Section 4** - Emergency Response, Seismic Risk Assessment and Mitigation
- **Section 5** - WSCP Refinement Procedures
- **Section 6** - Plan Adoption, Submittal and Availability

All sections are applicable to Western Wholesale except Section 3, which is applicable to Western Retail only.

8.2 Overview of the Wholesale Requirements of the WSCP

The Water Code establishes several prescriptive elements which must be included in a wholesale water supplier's WSCP. Each element and its location within the WSCP is described below.

Water Supply Reliability Analysis: Summarizes Western Wholesale's water supply reliability and identifies any key issues that may trigger a shortage condition. This requirement is addressed in Section 2 of the WSCP.

Annual Water Supply and Demand Assessment Procedures: Describes the key data inputs, evaluation criteria, and methodology for assessing the Western Wholesale system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions. This requirement is addressed in Section 2 of the WSCP.

Shortage Stages: Establishes water shortage levels to clearly identify and prepare for shortages. This requirement is addressed in Section 2 of the WSCP.

Shortage Response Actions: Describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand. This requirement is addressed in Section 2 of the WSCP.

Communication Protocols: Describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements. This requirement is addressed in Section 2 of the WSCP.

Legal Authority: Lists the legal documents that grant Western the authority to declare a water shortage and implement and enforce response actions. This requirement is addressed in Section 2 of the WSCP.

Financial Consequences of WSCP Implementation: Describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens. This requirement is addressed in Section 2 of the WSCP.

WSCP Refinement Procedures: Describes the factors that may trigger updates to the WSCP and outlines how to complete an update. This requirement is addressed in Section 5 of the WSCP.

Plan Adoption, Submittal, and Availability: Describes the process for the WSCP adoption, submittal, and availability after each revision. This requirement is addressed in Section 6 of the WSCP.

Part 3

Western Retail

9

WESTERN MUNICIPAL WATER DISTRICT

Retail Water Supply

Western retail utilizes a variety of supply sources, including imported water and local groundwater from various basins. Potential future water supply sources focus on local projects to increase regional reliability and reduce dependence on imported water.

IN THIS SECTION

- Water Supply Overview
- Water Supply Characterization
- Energy Intensity

9.1 Water Supply Overview

Western has invested in local supply sources to reduce dependence on imported water and maintain reasonable costs for their customers. Western's supply sources are expected to meet projected demands and are sustainably managed to be drought resilient. However, to protect local sources and offset financial impacts from imported water, Western will continue to promote conservation and enhance local reliability.

The Riverside service area uses local groundwater from potable and non-potable sources, potable and non-potable imported water and recycled water.

The Murrieta service area uses local groundwater. In recent years, imported water from Eastern has also been used.

The Rainbow service area uses only imported water.

9.2 Retail Water Supply Characterization

As mentioned, Western's retail system uses a variety of supply sources and are detailed below.

9.2.1 Purchased or Imported Water

Imported Water from Metropolitan

In 2020, Western retail obtained approximately 60 percent of its total supply as imported water from Metropolitan. The Riverside service area receives treated imported water from the Mills WTP, delivered through the Mills Gravity Line. Western may also purchase untreated water from Metropolitan to serve non-potable uses.

The Murrieta system uses imported water, delivered by Eastern through the Los Alamos interconnection, to supplement local groundwater supplies.

The Rainbow system relies solely on treated imported water from Metropolitan.

Western uses imported water to meet the balance of demands not met by local sources. Western strives to utilize local sources prior to Metropolitan water to minimize costs.

City of Riverside

In 2017, the City of Riverside and Western executed a Cooperative Agreement for Long-Term Wheeling and Surplus Water Sales (2017 Agreement), attached in **Appendix H**. The 2017 Agreement provides Western up to 2,000 AFY of City of Riverside surplus water until 2027 (which may continue after 2027 with both party's approval). The 2017 Agreement also provides the wheeling of up to 4,600 AFY of Meeks and Daley Water Company water to Western (described below). Currently, Western takes delivery of this water at two locations; the Mockingbird and Whitegates interconnections. Western is currently in design for two additional connections with the City of Riverside to add redundancy, flexibility, and potentially additional deliveries in the future.

Western also purchases non-potable water from the Riverside-Arlington basin from the City of Riverside, which is delivered through the Riverside Canal. Through coordination with Riverside, non-potable supplies from the RPU are expected to continue to be available to Western in the future.

Meeks and Daley Water Company

Western and EVMWD have a contractual agreement for Western to use EVMWD's Meeks and Daley Water Company (Meeks and Daley) rights within the SBBA. These rights are owned by EVMWD and leased to Western in exchange for capacity in the Mills Gravity Line that EVMWD uses for imported Metropolitan water. The purchase agreement between Western and EVMWD is provided in **Appendix I**. Western obtains 4,680 AFY for their retail system through this agreement. Western also owns shares in Meeks and Daley that entitle them to 226.52 AFY from the SBBA, which is shown in **Section 13.2.2**.

Since Western does not own or operate infrastructure that can directly extract water from the SBBA basin, the City of Riverside pumps and delivers this water to Western through system interconnections under the 2017 Agreement as the "long-term wheeling" portion of the agreement. Each year, Western and Riverside develop an operating plan to establish the expected delivery schedule for that year for the Riverside surplus water and Western's total Meeks & Daley water supply. A copy of the 2021 Operating Plan is provided in **Appendix J**. Western has the ability to move up to 7,208 AFY to their Retail system under this agreement.

EVMWD

Western also purchases non-potable water from the Riverside-Arlington basin from EVMWD's Palm Well, which is delivered through the Riverside Canal. Through coordination with EVMWD, non-potable supplies from the Palm Well area expected to continue to be available to Western in the future.

Riverside Highland Water Company

In the past, Western has also entered into 1-year lease agreements with RHWC to acquire up to 1,500 AFY from RHWC's adjusted groundwater rights from the SBBA. Western may enter into such agreements again in the future; however, since no current agreement is in place, leased RHWC shares are not included in Western's supply estimates for this UWMP.

Chino Desalter

The Chino Sub basin is an adjudicated basin managed by the Chino Basin Watermaster. The Chino Sub basin lies in the southwest corner of San Bernardino County and is bordered to the east by the Rialto-Colton fault. In the other three directions, the Chino Sub basin is ringed by impermeable mountain rock, the San Gabriel Mountains to the north, the Jurupa Mountains and Puente Hills to the south and southwest.

On January 2, 1975, several Chino Basin producers filed suit in California State Superior Court for San Bernardino County (the "Court") to settle the problem of allocating water rights in the Chino Basin. On January 27, 1978, the Court entered a judgment in Chino Basin Municipal Water District v. City of Chino et al. adjudicating water rights in the Chino Basin and establishing the Chino Basin Watermaster. The Judgment adjudicated all groundwater rights in Chino Basin and contains a physical solution to meet the requirements of water users having rights in or dependent upon the Chino Basin. The Judgment also appointed the Watermaster to account for and implement the management of the Chino Basin. The Judgment declared that the initial operating safe yield of the Chino Basin is 145,000 AFY. The Basin is managed through implementation of the Chino Optimum Basin Management Plan.

Portions of the Chino Basin have been degraded by elevated concentrations of TDS and nitrate. Similar to the Arlington Desalter, Chino Desalter facilities have been constructed to provide a local source of potable water and decreasing subsurface outflow of low-quality groundwater to the Santa Ana River.

The Chino Basin Desalter Authority (CDA) oversees operation of the Chino Desalter facilities. The Chino Desalter is comprised of two facilities: Chino I and Chino II. These facilities remove salts from brackish groundwater extracted from the Chino Basin. Chino I is located in Chino and began operation in 2000, with an initial capacity of 9,000 AFY. It is operated and maintained by Inland Empire Utilities Agency (IEUA) and treats brackish groundwater through reverse osmosis (RO) and ion exchange technologies (IX).

JCSD operates and maintains the Chino II facility in Jurupa Valley. Chino II began operation in 2006 and initially treated up to 11,820 AFY. In 2016, the Chino II facility was expanded to treat up to 21,000 AFY (2). The Chino II Desalter also utilizes RO and IX to treat the brackish groundwater.

Western Retail owns 3,534 AFY of capacity in the Chino II Desalter. However, Western Retail does not currently use this source and as a result leases it to Jurupa Community Services District.

9.2.2 Groundwater

As discussed previously, Western owns shares in Meeks and Daley that entitle them to produce 226.52 AFY from the SBBA, which is conveyed by the City of Riverside and used in the Riverside retail system.

Western directly extracts groundwater for their retail customers in the Murrieta service area from the Temecula Valley Basin.

Total groundwater extractions from 2016 through 2020 are provided in **Table 9-1**. Descriptions of these basins are provided in **Chapter 4**.

Table 9-1. Groundwater Extractions, AFY

BASIN	2016	2017	2018	2019	2020
Temecula Valley	398	423	398	370	399
San Bernardino Basin Area[1]	226.52	226.52	226.52	226.52	226.52
TOTAL	**624**	**650**	**624**	**596**	**626**

[1]The City of Riverside pumps this groundwater on Western's behalf. Western owns 226.52 AFY of Meeks and Daley water rights within the San Bernardino Basin Area.

Temecula Valley Basin

The Temecula Valley Basin (DWR designated Basin 9.005) lies under several valleys within the southwest portion of Riverside County and parts of northern San Diego County. The Temecula Valley Basin is bound by nonwater-bearing crystalline rocks of the Peninsular Ranges. The overlying valleys are drained by Wilson, Temecula, Murrieta, Warm Springs, and Pechanga Creeks to the Santa Margarita River, which flows west out of the Temecula Valley. The Pechanga Indian Reservation also overlies portions of the southwestern part of the basin. The Temecula Valley Basin typically receives 7 to 15 inches of rainfall each year (California Department of Water Resources).

The Temecula-Murrieta subbasin is an alluvial basin within the Temecula Valley Basin. Within the Temecula-Murrieta Basin lie two aquifers: the Pauba aquifer and the Temecula aquifer, the latter of which underlies the former. The Pauba aquifer covers approximately 18 square miles and the Temecula aquifer extends over an area of approximately 100 square miles.

As part of the Santa Margarita River system, surface water and groundwater supporting surface water (defined as being in the older and younger alluvium) within the Temecula-Murrieta Basin have been under some form of court jurisdiction since 1928. Rights to utilize surface water and groundwater determined to be contributing to the Santa Margarita River are governed by the Modified Final Judgment and Decree entered on April 6, 1966 by the U.S. District Court in United States v. Fallbrook Public Utility District, et al. (Civil No. 1247-SD-T) (provided in **Appendix K**). A Watermaster was appointed in March 1989 to administer and enforce the provisions of the judgment and subsequent orders of the Court. A Steering Committee, currently comprising representatives from the United States, Eastern Municipal Water District (Eastern), Western, Fallbrook Public Utility District (Fallbrook PUD), Metropolitan, the Pechanga Tribe, and RCWD, was also appointed. The purpose of the Steering Committee is to assist the Court and the Watermaster in administering the water rights (Santa Margarita River Watershed Watermaster Report, 2013). The following presents a summary of the groundwater management agencies in the Temecula-Murrieta Basin:

- **Santa Margarita River Watershed Watermaster** – Court approved Watermaster for oversight and administration of water rights
- **Santa Margarita River Watershed Steering Committee** – Assist the Court and the Watermaster in administering the water rights
- **Rancho California Water District** – Prepares Groundwater Audit and Recommended Groundwater Production Report for operation of District groundwater wells and recharge facilities

The Groundwater Audit and Recommended Groundwater Production Report (RGPR) sets limits for producers in the Temecula-Murrieta Basin. The amount of groundwater that can be produced varies due to such factors as rainfall, recharge area, and amount and location of well pumping capacity.

San Bernardino Basin Area

The San Bernardino Basin Area (SBBA) was defined and adjudicated in gross by the Western-San Bernardino Judgment (Western Judgment) in 1969. The SBBA has a surface area of approximately 141 square miles and lies between the San Andreas and San Jacinto faults. The basin is bordered on the northwest by the San Gabriel Mountains and Cucamonga fault zone; on the northeast by the San Bernardino Mountains and San Andreas fault zone; on the east by the Banning fault and Crafton Hills; and on the south by a low, east-facing escarpment of the San Jacinto fault and the San Timoteo Badlands. Alluvial fans extend from the base of the mountains and hills that surround the valley and coalesce to form a broad, sloping alluvial plain in the central part of the valley. The SBBA encompasses the Bunker Hill sub basin (DWR designated Basin 8.02-06) also includes a small portion of the Yucaipa Basin (DWR designated Basin 8-02.07) and Rialto-Colton Basin (DWR designated Basin 8-02.04).

It was determined in the Western Judgment that the Plaintiffs (Riverside County agencies) have a 64,862 AFY share of the safe yield, which equates to 27.95% of the safe yield. The Plaintiffs include the City of Riverside (the successor to the Riverside Water Company and the Gage Canal Company), Riverside Highland Water Company, Meeks & Daley Water Company, and Regents of the University of California. Non-plaintiffs are agencies in San Bernardino County represented by San Bernardino Valley Municipal Water District and are entitled to 72.05% of the safe yield, or 167,238 AF. The Riverside County agencies may not exceed their allocation unless they participate in “New Conservation” (explained below).

The Western Judgment contemplates that the parties will undertake “new conservation” which is defined as any increase in replenishment from natural precipitation which results from operation of works and facilities not in existence as of 1969, other than works installed to offset losses from flood control channelization. The Western Judgment specifies that the parties to the Judgment have the right to participate in any new conservation projects, provided they pay the appropriate share of the cost. The net effect of new conservation is an increase in pumping rights by the Plaintiffs and “credits” for the non-Plaintiffs.

In 2013, both the Plaintiffs and Non-Plaintiffs agreed to participate in the cost to capture water that historically flowed to the ocean. This New Conservation was due to the construction and operation of the Seven Oaks Dam. The 2015 Annual Report for the Western-San Bernardino Annual Report increases the rights for both Parties, as shown in Table 9-2.

Table 9-2. Adjusted SBBA Rights Due to New Conservation Allocation

PARTIES	PERCENTAGE	SAFE YIELD ALLOCATION (AF)	NEW CONSERVATION ALLOCATION (AF)	ADJUSTED RIGHT (AF)
NON-PLAINTIFFS (SAN BERNARDINO COUNTY AGENCIES)	**72.05%**	**167,238**	**5,507**	**172,745**
PLAINTIFFS (RIVERSIDE COUNTY AGENCIES)	**27.95%**	**64,862**	**2,136**	**66,998**
	City of Riverside	52,199	1,719	53,918
	Riverside Highland Water Company	4,294	141	4,435
	Agua Mansa and Meeks and Daley Water Company	7,833	258	8,091
	Regents of the University of California	536	18	554
TOTAL SUM OF EXTRACTIONS	**100%**	**232,100**	**7,643**	**239,743**

Riverside-Arlington Basin

Western is planning to construct a new non-potable well in the Riverside Arlington Basin to supplement non-potable supplies available from the Riverside Canal from RPU and the EVMWD Palm Well.

The Riverside-Arlington Basin is described in Section 4.2.2.1.

9.2.3 Surface Water and Stormwater

Western does not directly utilize any surface water or stormwater sources for their retail system. However, Western represents the Riverside county agencies as the Watermaster for the SBBA and participates in regional projects to capture stormwater to enhance the long-term sustainability of the SBBA and help mitigate the effects of climate change on local supplies. As a shareholder of Meeks and Daley Water Company, Western Retail benefits.

9.2.4 Wastewater and Recycled Water

As described in **Section 4.1.3**, There are two wastewater treatment plants that provide recycled water to Western Retail: the Western WRF and the WRCRWA Treatment Plant. Recycled water is used in the Riverside Service Area only. Western leverages the recycled water program to increase supply reliability and reduce the amount of imported water.

Recycled Water Coordination

Western adopted its “Western Strategic Plan” in 2012 to respond to on-going water resource issues in Southern California. Of the five goals developed in the plan, the first, Source Water Reliability, is to develop a water supply reliability portfolio while determining the financial feasibility of projects. In December 2009, Western prepared a Recycled Water Master Plan (RWMP), which was updated in June 2014 (Albert A. Webb Associates for Western Municipal Water District, June 2014). Western coordinated with multiple agencies to provide input during development of the original, including Riverside Public Utilities, Gage Canal Company, and Riverside Unified School District to determine potential recycled water demands.

Wastewater Collection, Treatment, and Disposal

The Western WRF and WRCRWA provide wastewater collection and treatment services for Western’s Riverside Retail Service Area. Western operates the WRCRWA Treatment Plant, which is a regional wastewater treatment facility owned by WRCRWA, a joint powers authority composed of the cities of Norco and Corona, Jurupa Community Services District, Home Gardens Sanitary District, and Western.

Western also owns and operates the Western WRF, formerly the March Wastewater Treatment Plant. The WWRF was expanded in 2011 to a capacity of 3 MGD tertiary treatment. Recycled water is then distributed to customers including the Riverside National Cemetery, General Archie Old Golf Course, schools, parks, groves, and nurseries.

Wastewater treatment in Western’s other retail areas is provided by EMWD at the Temecula Valley Regional Water Reclamation Facility and Rancho California Water District at the Santa Rosa Water Reclamation Facility. Both EMWD and Rancho California Water District already utilize flows from their wastewater plants to create recycled water. Because these facilities already produce recycled water, flows to these two plants do not have the potential to provide additional recycled water to Western.

WRCRWA Treatment Plant

The WRCRWA Treatment Plant is a 14 MGD tertiary facility that currently discharges all flows to the Santa Ana River. A recent Change of Use Petition has been granted to enable future re-use of recycled water from the WRCWRA Treatment Plan. There are no existing recycled water facilities to deliver the WRCWRA water to Western's service area so Western is exploring other opportunities to make beneficial use of their share of the recycled water.

From 2017 to 2019, the average WRCWRA flow generated by Western retail customers was 0.73 MGD (about 820 AFY) and is expected to increase to 1.6 MGD (about 1,800 AFY) at buildout.

Western Water Recycling Facility

Western operates the WWRF, which treats domestic wastewater from March Air Reserve Base and the north-central portion of the Riverside Service Area. The plant was upgraded in 2014 to produce 2,200 AFY of tertiary treated wastewater, which is discharged to an impoundment and then pumped to supply the recycled water system. The recycled water is provided to the Riverside National Cemetery, General Old Golf Course, and various landscaping, agricultural and commercial use sites. When supply exceeds demand, such as during wet winter months, excess recycled water is stored in the on-site impoundment until needed. If recycled water demands exceed supply, March Air Force Base's Expanded Groundwater Extractions and Treatment System (EGETS) may operate and send groundwater flows to blend with recycled water in Western's on-site storage ponds at the WWRF. If there is a large discrepancy between recycled water demand and recycled water supply, excess recycled water from the WWRF can be placed in Western's existing sewer collection system for conveyance and treatment to WRCRWA, where it is eventually discharged to the Santa Ana River.

The volume of influent to the WWRF, and new demand for recycled water is dependent on new development in the Riverside Service Area. Increasing the available supply of recycled water will allow customers who currently use non-potable water from the CRA to switch to a more drought- proof local supply for their non-potable water needs.

Recycled Water System Description

As mentioned, Western utilizes recycled water in the Riverside Service Area only. The recycled water system consists of nearly 56 miles of pipeline ranging from 4 to 42 inches in diameter; eight pump stations with 25 pumps and a combined rating of 5,175 horsepower; and a storage capacity of 1.3 MG in five tanks and one open reservoir. Western has an additional two open reservoirs, but they are not currently used in normal operation and not included in the storage totals outlined in the RWMP (Albert A. Webb Associates for Western Municipal Water District, June 2014).

Recycled water from the WWRF is provided to the Riverside National Cemetery and General Archie Old Golf Course as well as various parks, schools, groves, and nurseries. Recycled water is a drought-proof supply as it stems from wastewater by customers within Western's service area.

Potential, Current, and Projected Recycled Water Uses

Recycled water provided by Western is used by a limited number of customers, primarily those with large outdoor irrigation needs. Western anticipates future recycled water use to expand to additional customers, who will be able to reduce their outdoor use of potable water. Western is currently updating its Riverside Facilities Master Plan for the non-potable system and is investigating opportunities to expand recycled water service to existing and future customers.

Current Use

In 2020, Western delivered 1,758 AFY tertiary treated recycled water to its retail customers. This exceeds the volume anticipated in the 2015 UWMP.

Potential Users

Western has been working with commercial, residential, and institutional developments in the retail area to ensure that recycled water can be used to the fullest extent possible. Potential users within Western's service area include all industrial, commercial, and agricultural users that currently utilize potable and non-potable supply from the Riverside Canal and the CRA. Specific areas identified in the RWMP for potential expansion include the Orangecrest and Mission Grove areas and the Meridian Business Park. Western is flexible and open to additional developments and interest in recycled water use. Three Riverside Unified School District (RUSD) and one Val Verde Unified School District schools have been plumbed or retrofitted for recycled water. All new residential projects will be conditioned to install recycled water systems for parks and common areas. Additional recycled water users are identified in the RWMP. Total existing and future demand is anticipated to be approximately 8,000 AFY (Albert A. Webb Associates for Western Municipal Water District, June 2014).

Actions to Encourage and Optimize Future Recycled Water Use

The primary means by which Western encourages recycled water use is through their water rate structure. Non-potable and recycled water customer rates are substantially lower than potable water. In addition, recycled water use is mandated by Ordinance 377 in those areas where recycled water is available and can be used properly. Industrial and commercial developers near non-potable distribution pipelines are required to plan for future use of recycled water, including installing proper piping and facilities to minimize economic impacts when recycled water becomes available at the use site. This is implemented through the plan check process, where plans are not approved until the required recycled water facilities are designed.

As mentioned, Western is in the process of updating their Riverside Facilities Master Plan. This effort will continue to analyze future recycled water use and assess infrastructure needs to promote additional recycled water use and offset potable demand.

9.2.5 Desalinated Water Opportunities

As described above, Western is already pursuing the use of desalinated groundwater as part of its long-term water supply. Western is a member agency of the Chino Basin Desalter Authority and owns 3,534 AFY of capacity. The Chino Basin Desalter treats brackish groundwater to potable quality and may be expanded in the future. Currently, Western's shares are sold to the City of Norco.

Western's service area is located on the other side of the Santa Ana Mountains from the Pacific Ocean. Seawater desalination, as a source of supply for Western, would require development of a coastal desalination facility and either construction of a conveyance pipeline and associated appurtenances from the coast inland and over the mountains to Western's service area, or development of an exchange agreement with another agency to trade desalted water for Metropolitan supplies.

The development of (or participation in) a new water supply using a seawater desalination technique, while costly, is being investigated by other wholesale and retail water agencies in Southern California. Because Western is an inland area, desalination would only work if Western joined with other water purveyors in the development of a coastal desalination facility, and then received water from the SWP supplies of other participants via an exchange. It is not cost effective nor environmentally sound for Western to receive direct delivery of desalted ocean water due to the distance and the topography between Western and the Pacific Ocean.

9.2.6 Water Exchanges and Transfers

Western does not currently have any exchange or transfer agreements aside from agreements already discussed that pertain to local groundwater and purchases.

Emergency Interties

Western has interties with Eastern and EVMWD for use as an emergency supply source. Western also has interconnections with the cities of Riverside and Corona.

9.2.7 Future Water Projects

Eastern, a neighboring agency of Western, has developed the North Perris Groundwater Basin Program to remediate contamination within the North Perris Groundwater Basins, protect non-contaminated areas of the basin, develop a local source of supply, including a secondary, secure potable supply for MARB, as well as provide long-term remediation of rising groundwater levels within MARB. Because of potential issues with serving MARB, Western and Eastern have entered into an interagency agreement for the Perris North Project, headed by Eastern. The interagency agreement, attached in **Appendix M** allows Western to purchase Perris North Project water in accordance with the Maximum Allocation Schedule if and when MARB demands increase in the future. The project is expected to produce approximately 6,750 AFY of total supply, with Western initially purchasing 500 AFY following completion of the project then increasing up to 1,500 AFY by 2040.

Table 9-3. Future Water Supply Projects

FUTURE SUPPLY PROJECT	DESCRIPTION	PLANNED IMPLEMENTATION YEAR	PLANNED FOR USE IN YEAR TYPE	EXPECTED INCREASE IN SUPPLY
Perris North Project	Joint Project with Eastern Municipal Water District	2025	All Year Types	500 – 1,500 AFY

9.2.8 Summary of Existing and Planned Sources of Water

As described throughout this chapter, Western has worked to develop a variety of local and imported water supplies to meet their customer demands. Western will continue to work to secure local supplies and increase reliability, while promoting conservation and/or recycled water use. **Table 9-4** summaries the various supplies used in 2020 and **Table 9-5** and

Figure 9-1 summarize projected supply through 2045.

Table 9-4. 2020 Water Supply, AFY

SUPPLY SOURCE	SUPPLY, AFY
POTABLE	**21,831**
Metropolitan	14,148
Groundwater (San Bernardino Basin, Western Meeks and Daley)	226.52
Groundwater (San Bernardino Basin, Leased Meeks and Daley)	4,208
Groundwater (RPU Surplus)	1,016
Groundwater (Temecula Valley Basin)	399
Eastern (Murrieta)	1,834
NON-POTABLE	**4,910**
Metropolitan	1,819
EVMWD (Riverside-Arlington Groundwater)	942
RPU (Riverside-Arlington Groundwater)	390
WWRF	1,758
TOTAL SUPPLY	**26,741**

Table 9-5. Projected Supply, AFY

SUPPLY SOURCE	2025	2030	2035	2040	2045
POTABLE	**27,073**	**30,199**	**33,686**	**37,574**	**41,821**
Metropolitan[1]	14,680	19,306	22,293	26,181	31,928
Chino Desalter[2]	3,534	3,534	3,534	3,534	3,534
Temecula Valley Basin Groundwater [3]	1,452	1,452	1,452	1,452	1,452
Leased Meeks and Daley[4]	4,680	4,680	4,680	4,680	4,680
Western Owned Meeks and Daley[5]	226.52	226.52	226.52	226.52	226.52
City of Riverside Surplus[6]	2,000				
Eastern North Perris Agreement[7]	500	1,000	1,500	1,500	
NON-POTABLE	**7,031**	**8,066**	**8,964**	**9,966**	**11,079**
Metropolitan[8]	1,671	1,300	1,300	1,300	1,681
Riverside-Arlington Basin Groundwater[9]	2,500	3,131	3,104	3,465	4,100
WWRF[10]	1,940	2,598	3,481	4,032	4,032
WRCWRA[11]	920	997	1,079	1,169	1,266
TOTAL SUPPLY	**34,104**	**38,265**	**42,650**	**47,540**	**52,900**

[1]Available supply from Metropolitan determined as the remaining demand not met by local supply sources with a 10% buffer.

[2]Western's shares of the Chino Desalter, currently leased to Jurupa Community Services District.

[3]Planned groundwater extractions to serve the Murrieta service area.

[4]Agreement with EVMWD to lease Meeks and Daley groundwater rights.

[5]Western-owned Meeks and Daley groundwater rights.

[6]Based on the 2017 Agreement, surplus water sales. Additional surplus supply may be available in the future but is not guaranteed.

[7]Eastern Perris North Project.

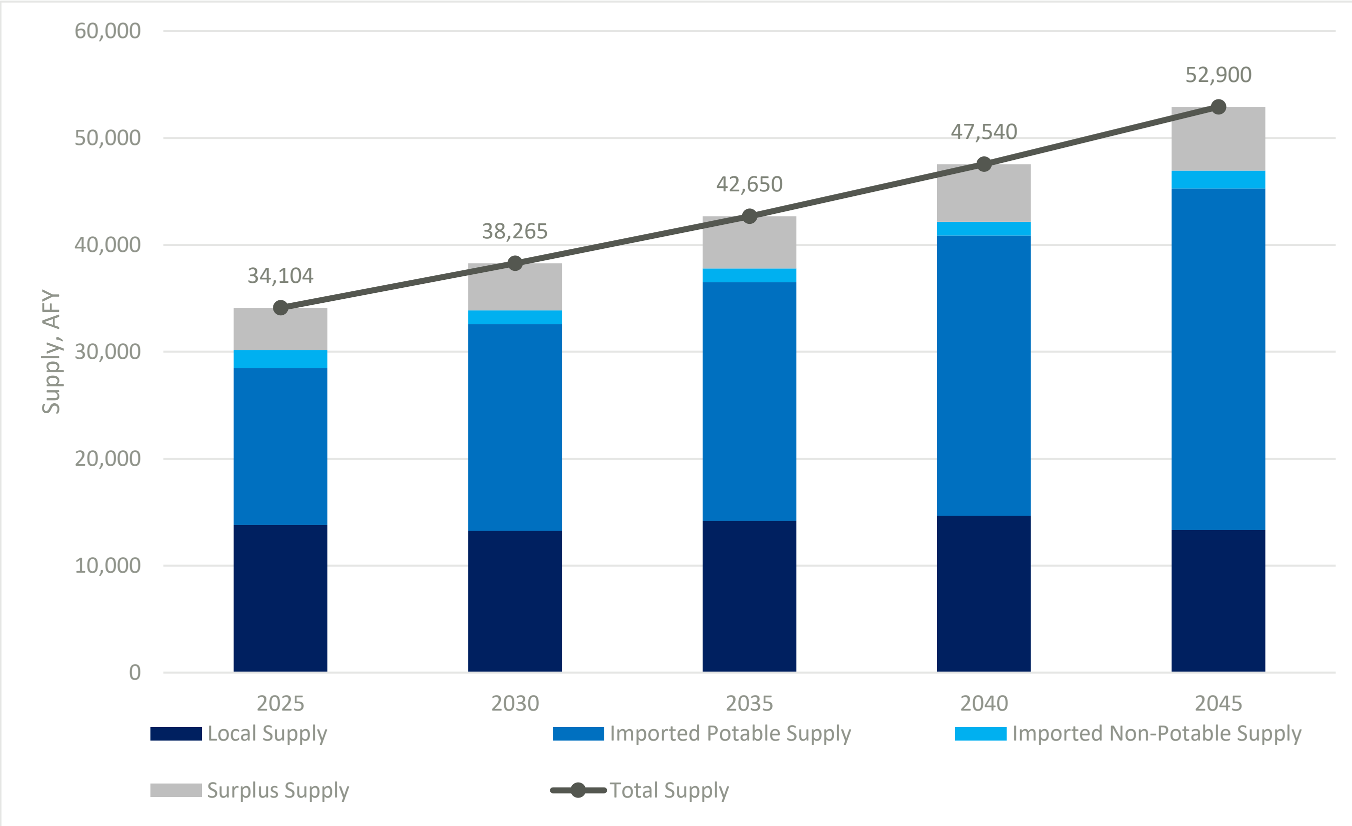
[8] Non-potable supply from Metropolitan is assumed to meet the remaining demand not met by local supply sources.

[9]Expected supply used from local non-potable groundwater and delivered through the Riverside Canal, including Western's planned non-potable well and purchases from RPU and EVMWD's Palm Well.

[10]Projected 2030 WWRF effluent determined in the Riverside Non-Potable Facilities Master Plan. The rate of growth was calculated between 2030 and average 2017-2019 data (2018 used to determine rate of growth) and applied for years 2025 and 2030-2045. Based on this growth rate, the WWRF is expected to reach buildout between 2035 and 2040.

[11]WRCWRA supply is not currently available to Western Retail customers as no infrastructure currently exists to convey recycled water from the plant to Western Retail. This supply is currently considered surplus supply but Western is evaluating opportunities to make use of it.

Figure 9-1. Projected Retail Supply, AFY



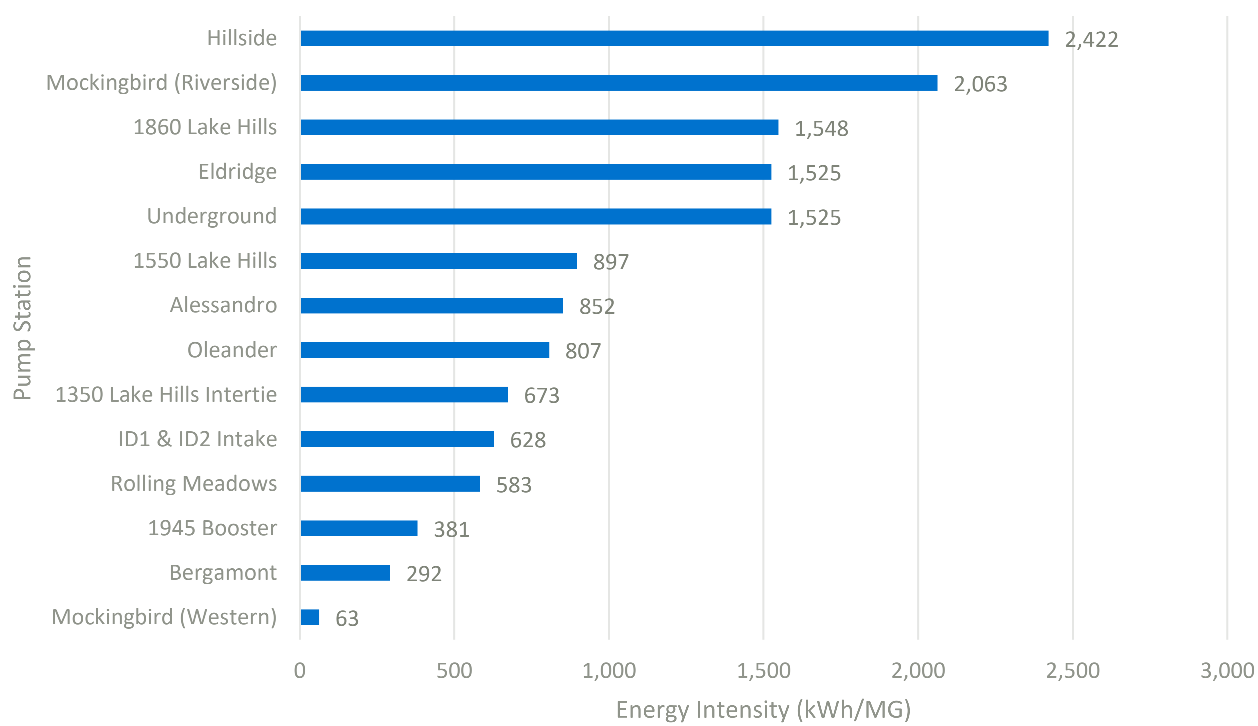
9.3 Energy Intensity

Western contracted with Hansen Allen & Luce, Inc. (HAL) to complete a Water System Optimization Study (Optimization Study) in 2018 and identify how Western could best align hydraulic performance, water quality, and energy efficiency for their Riverside service area. The Optimization Study more specifically analyzed overall hydraulic performance, storage utilization, pump station operation, energy efficiency, and water quality. Western's existing hydraulic model and energy usage for 2014 through 2017 was used as the basis for the optimization analysis.

In addition to electricity, Western uses natural gas to operate their system. The Holcomb Pump Station is powered by natural gas from the Shell Energy Company. Other areas of the Riverside service area are powered from natural gas provided by the Southern California Gas Company (SoCal Gas). Both electricity and natural gas exhibit similar usage patterns, with peaks during the summer months that mimic water demand trends.

The Optimization Study estimated the expected energy intensity for each pump station, as shown in **Figure 9-2** (Hansen Allen & Luce, Inc. for Western Municipal Water District, October 2018). Overall, the study estimated that the average energy intensity for the Riverside service area is approximately 3,700 kWh/MG (kilo-watt-hours per million gallons). This value does not include the energy intensity from imported water or water purchased from other agencies.

Figure 9-2. Estimated Energy Consumed by Pump Station (Hansen Allen & Luce, Inc. for Western Municipal Water District, October 2018)



10 WESTERN MUNICIPAL WATER DISTRICT
Retail Water Use

This chapter describes historical, current, and projected water uses for Western's retail service areas.

Western provides potable water to customers within the Riverside, Murrieta, and Rainbow service areas. In addition, Western provides non-potable water to customers in the Riverside service area.

Between 2016 – 2020, Western retail customers used an average of 23,000 AFY of water.

IN THIS SECTION

- Non-Potable and Potable Water Use
- Past, Current, and Projected Water Use
- SBX7-7 Baselines, Targets, and Compliance

10.1 Non-Potable and Potable Water Use

Western's Riverside retail service area uses water for both potable and non-potable uses. Potable uses include agriculture, commercial, single-family residential, multi-family residential, landscape, industrial, military, temporary, and Fireline uses. Temporary connections include meters issued for construction water use.

Non-potable water is also used for agriculture and landscape and is tracked separately. The non-potable system uses a blend of recycled water, non-potable groundwater, and non-potable imported water.

The Murrieta and Rainbow retail service areas use potable water for a variety of uses, including single-family, multi-family, commercial, landscape, and others. These systems do not currently use non-potable water.

10.2 Past, Current, and Projected Water Use by Sector

Past, current, and projected water uses for Western's retail system is discussed in the following sections. In 2020, the largest customer category was single-family customers that used approximately 60% of the total water consumed.

10.2.1 Past Water Use

Water use in Western's retail systems has varied from 2013 to 2020. There was a notable decline in 2015 following the State's 2014 declaration of a drought emergency and implementation of statewide mandatory demand reductions. After the statewide restrictions ended in 2016, demands rebounded slightly but have not returned to 2013 levels, despite adding nearly 1,600 new customer connections from 2013 to 2020. Western also implemented water budget rates for indoor and outdoor uses which has helped to limit total consumption and conserve water. This is an indication that Western's aggressive conservation program has been effective at achieving some permanent demand reductions. Note that for non-potable customers, Western's billing data does not differentiate recycled water use from other non-potable use so recycled water use is included. A summary of the water use for each retail service area is provided in **Figure 10-1**, **Figure 10-2**, and **Figure 10-3**. Total Western retail use is summarized in **Figure 10-4** and **Table 10-1**.

Figure 10-1. Riverside Service Area Historical Water Use, AFY

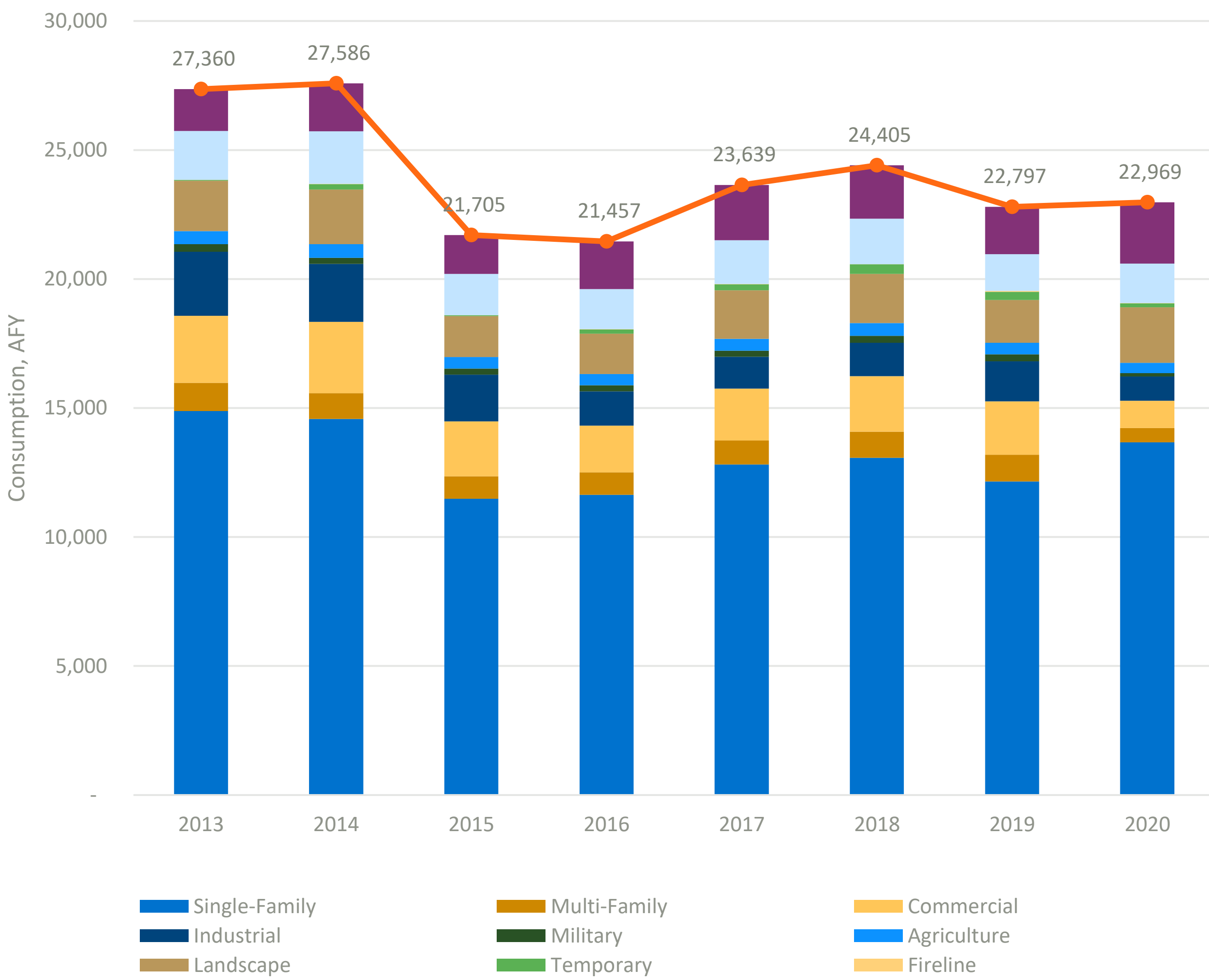


Figure 10-2. Murrieta Service Area Historical Water Use, AFY

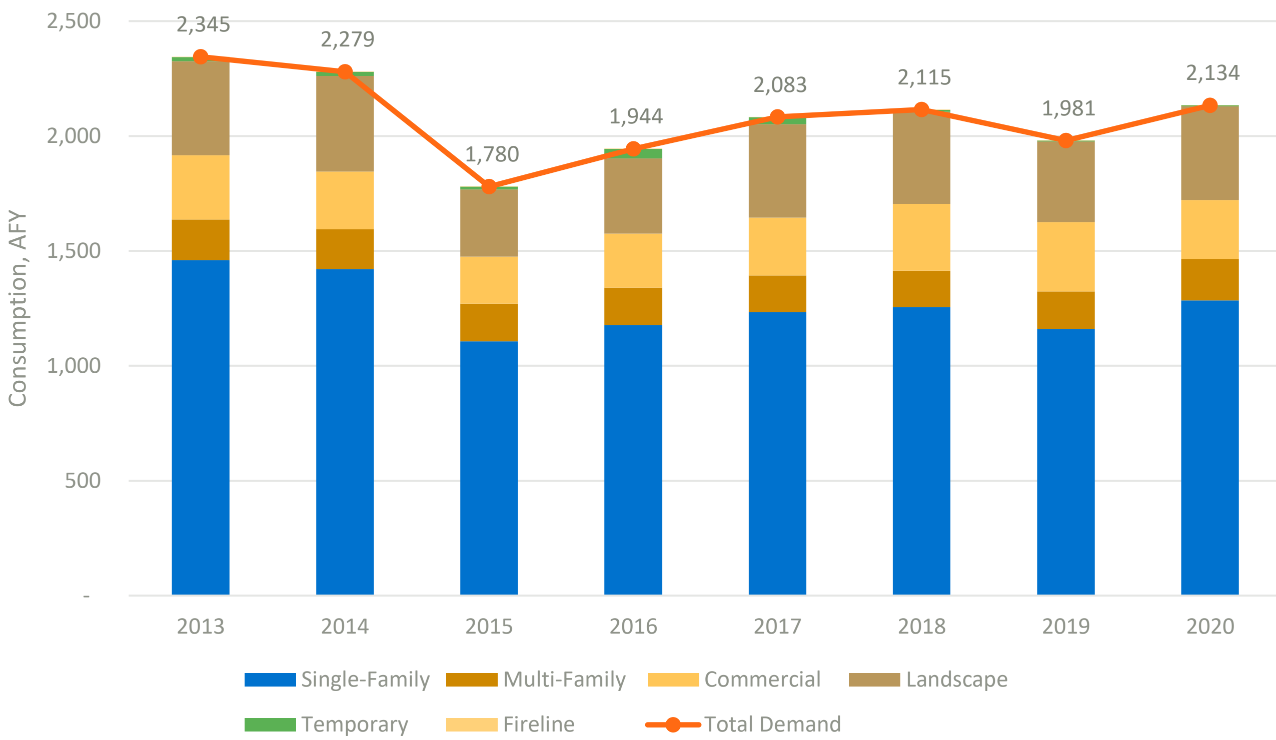


Figure 10-3. Rainbow Service Area Historical Water Use, AFY

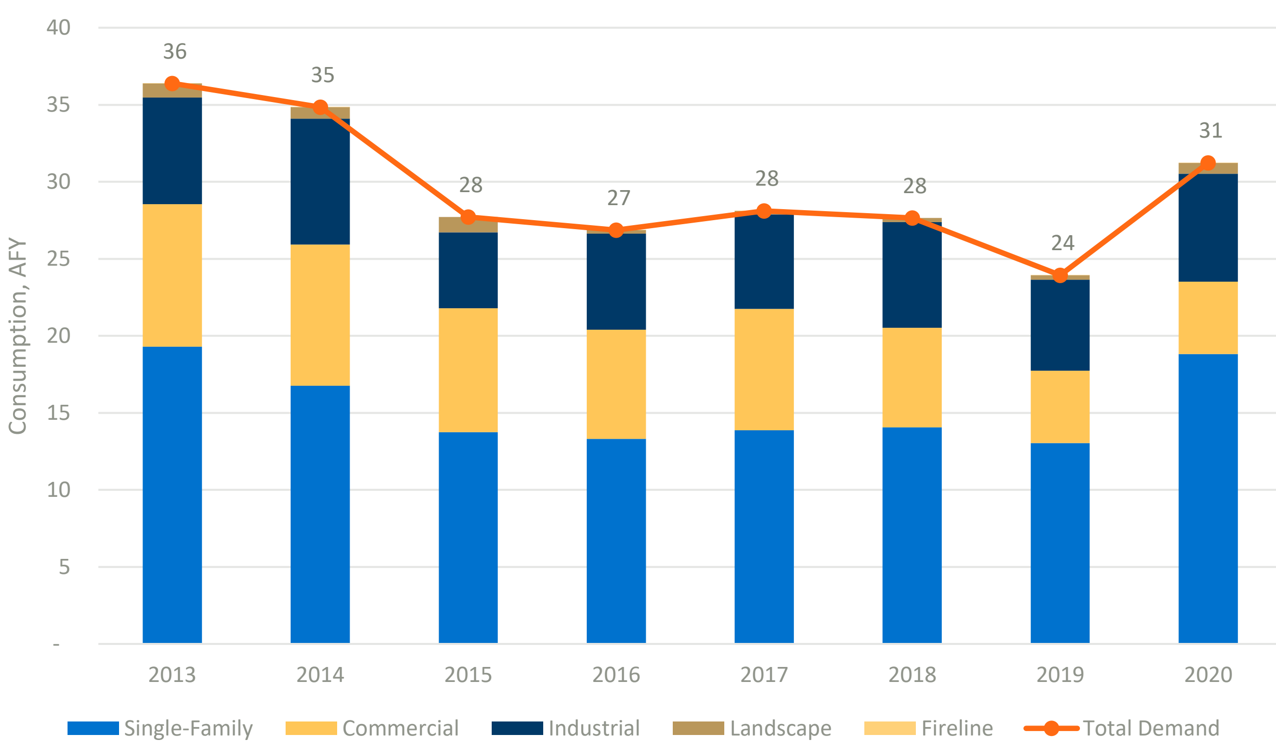
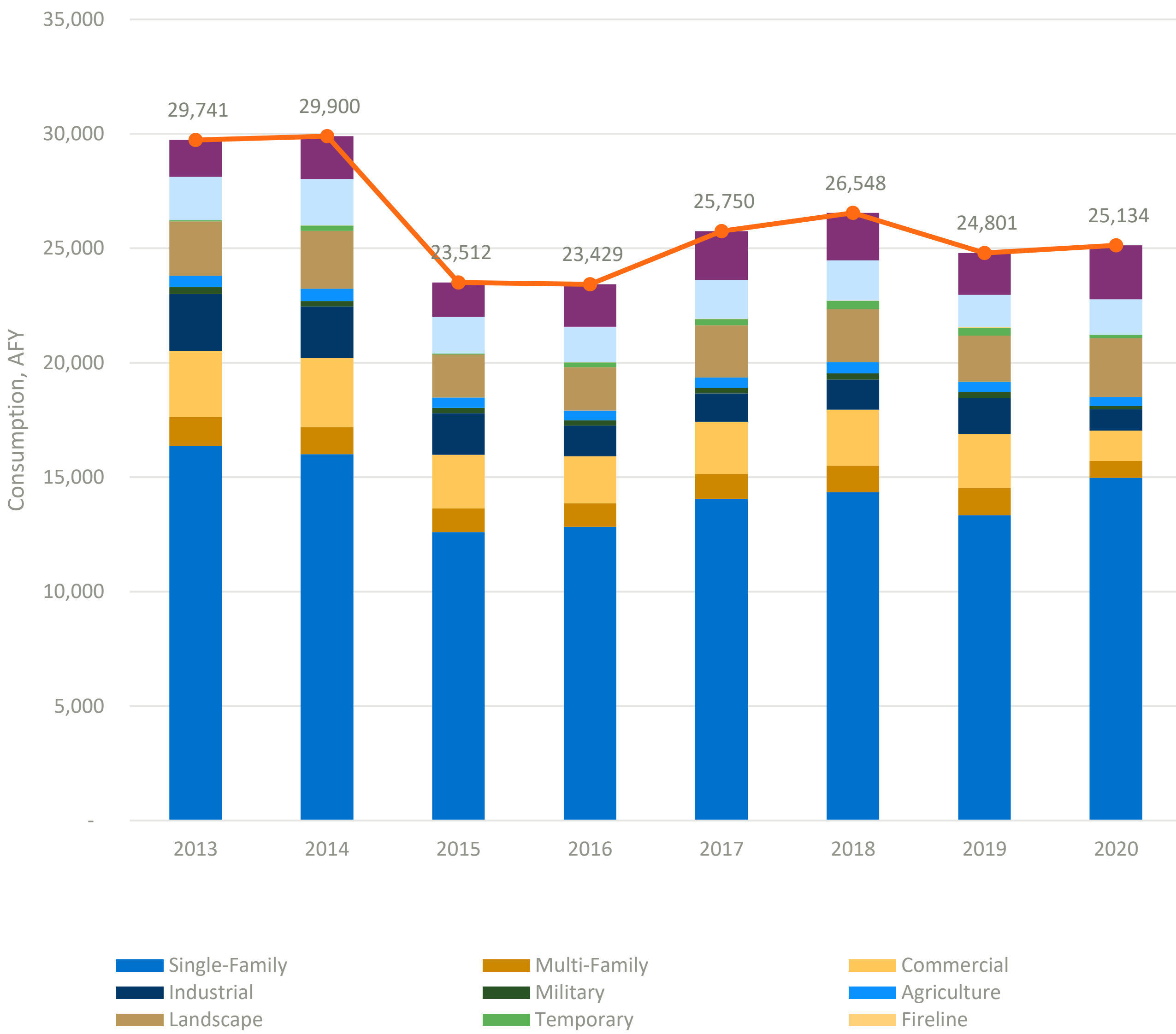


Table 10-1. Western Retail Historic and Current Water Use, AFY

WESTERN RETAIL TOTAL	2013	2014	2015	2016	2017	2018	2019	2020
POTABLE								
Agriculture	510	532	449	432	453	487	454	397
Commercial	2,897	3,019	2,345	2,050	2,273	2,450	2,371	1,328
Single-Family	16,362	16,010	12,600	12,830	14,058	14,344	13,332	14,973
Landscape	2,360	2,538	1,883	1,898	2,285	2,313	2,011	2,563
Industrial	2,487	2,258	1,814	1,338	1,245	1,305	1,565	940
Military	290	234	237	234	237	274	266	132
Multi-Family	1,265	1,179	1,036	1,033	1,089	1,162	1,193	731
Temporary	53	223	41	204	274	378	315	159
Fireline	2	11	2	7	6	7	37	6
TOTAL POTABLE	**26,226**	**26,003**	**20,406**	**20,025**	**21,919**	**22,720**	**21,545**	**21,230**
NON-POTABLE								
Agriculture – Non-Potable	1,896	2,036	1,603	1,553	1,696	1,758	1,421	1,538
Landscape – Non-Potable	1,619	1,862	1,502	1,850	2,135	2,070	1,835	2,366
TOTAL NON-POTABLE	**3,515**	**3,898**	**3,106**	**3,403**	**3,831**	**3,828**	**3,256**	**3,904**
TOTAL DEMAND	**29,741**	**29,900**	**23,512**	**23,429**	**25,750**	**26,548**	**24,801**	**25,134**

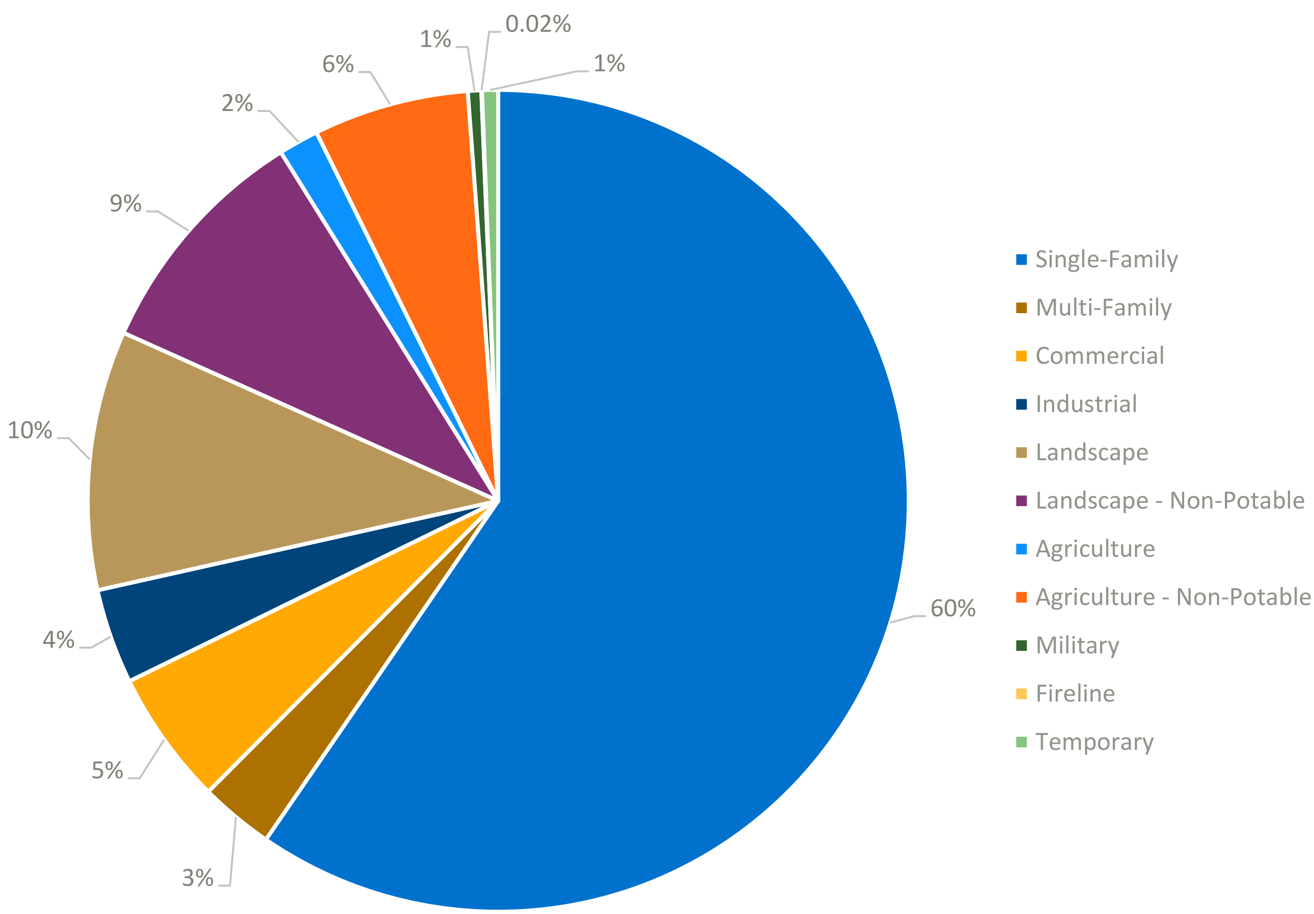
Figure 10-4. Western Retail Historical and Current Water Use, AFY



10.2.2 Current Water Use

In 2020, Western Retail (Riverside, Murrieta, and Rainbow service areas combined) used 25,134 AF of water. Single family residences consumed 60% of the total water used. The second largest customer category was landscape, using 10% of the total water demand. The breakdown of water use by customer category is illustrated in **Figure 10-5**.

Figure 10-5. Western Retail 2020 Water Use by Customer Category



10.2.3 Distribution System Water Losses

There are two types of water losses considered in the water loss audit, apparent losses, and real losses. Apparent losses are losses attributed to meter inaccuracies or data management (e.g., losses due to how water is accounted for or measured), while real losses are physical losses of water. Sources of distribution system water loss include:

- Leaks from water lines - Leakage from water pipes is a common occurrence in water systems. A significant number of leaks remain undetected over long periods of time as they are very small; however, these small leaks contribute to the overall water loss. Aging pipes typically have more leaks.
- Water used for flushing and fire hydrant operations
- Unauthorized uses or theft of water
- Meter Inaccuracies - meters can under-represent actual consumption in the water system.
- Unrecorded water uses when reservoirs overflow

Western has completed annual water loss audits for the Riverside retail system since 2015 following the procedures outlined by AWWA to identify and quantify system losses. These reports are submitted to the State each year by October 1. Western also prepares a water loss calculation for the Murrieta and Rainbow systems on an annual basis for internal use in managing water losses.

Historical water loss for each system is summarized in **Table 10-2**. The 2020 AWWA Water loss audit for Riverside system will not be available until October 1 per State requirements so an estimated water loss is shown based on the difference between total water supplied to the system and total water billed to the customers.

Table 10-2. Historical Water Losses for Retail Service Areas, AFY and Percent of Consumption

	2016	2017	2018	2019	2020
Riverside	3,236 (20%)	1,378 (8%)	1,262 (7%)	1,226 (7%)	562 (3%)
Murrieta	3 (<1%)	245 (11%)	27 (1%)	21 (1%)	99 (4.4%)
Rainbow	12 (33%)	9 (26%)	11 (30%)	7 (25%)	5 (12%)

Water losses for the Riverside service area have been trending down, likely due to recent replacement of water meters throughout the system; however, meters along the Mills Gravity Line may exhibit meter inaccuracies during low flow periods. The Murrieta system maintains consistently low water loss. The Rainbow service area exhibits high water losses due to all water being delivered through a single Metropolitan turnout (meter WR-13) and a handful of customers with relatively low use. Meter inaccuracies, especially during low flow periods, are expected to be the primary driver for the relatively high water loss in the Rainbow system.

The State Water Board is currently preparing performance standards for distribution system water loss. These standards are still being reviewed and finalized with stakeholder input. Western is committed to managing system water losses to reduce water waste and will endeavor to meet the future water loss performance standard once adopted by the State Water Board. A discussion of current and planned programs to manage water loss are included in **Chapter 15**, Retail Demand Management Measures.

For the purposes of projecting future demands, the Riverside system is assumed to maintain a 4% loss, the Murrieta system is assumed to maintain a 3% loss and the Rainbow system is assumed to maintain a 25% loss.

10.2.4 Projected Water Use

To estimate future potable water use, Western explored several demand projection methodologies based on SCAG and Department of Finance (DOF) projections, recent buildout studies, and ongoing master planning efforts. The growth rates projected by SCAG and DOF for the Riverside and Murrieta retail service areas indicated relatively low annual growth rates, which is not representative of the growth Western expects based on knowledge of planned developments. While these projections were not used as the sole basis for Western's population and demand projections, they were used as baseline comparisons.

Western also analyzed previous buildout studies for the Murrieta and Riverside service areas that were prepared in 2018 and 2019, respectively. These buildout studies included a parcel land-use based approach to determine the future buildout demand. The buildout studies informed demands for the ongoing Murrieta Water Facilities Master Plan and the ongoing Riverside Water Facilities Master Plan. Both master plans have more closely analyzed development that is expected to occur within the next 10 years, between 2020 and 2030. A comparison of 2020 actual demands and the 2030 projected demands in the Water Facilities Master plans yields an annual average growth rate of approximately 2.2%. Western anticipates that a similar trend may continue through 2045. To be consistent with the land use and development-based analysis prepared for the Water Facilities Master plans, Western elected to utilize a uniform 2.2% growth rate for the Riverside and Murrieta service areas.

Western's Rainbow service area has remained relatively constant in terms of growth and water use and minimal future growth is expected, which is consistent with the SCAG projections for this service area. To forecast demands for the Rainbow service area, the SCAG growth rate was applied to existing demand. Based on this analysis, demands within the Rainbow service area are estimated to increase by 6 AFY in 2045, compared to 2020 actual demand.

To project potable demands for each system, a linear interpolation for each service area was applied using the various growth rates described above. To estimate future water, use for each customer category, the percentage of total 2020 use was applied to total future demand. The estimated water loss percent was then applied for each system to determine the total projected water use.

To project Riverside retail non-potable demands, a similar approach was used. A comparison of 2020 actual non-potable demands and the 2030 projected non-potable demands in the Water Facilities Master plan yields an annual average growth rate of approximately 3%. After 2030, Western anticipates that non-potable use will continue to grow but at a slower rate. Non-potable demands after 2030 are anticipated to grow at 2.2%, the same rate as the potable system. Estimated water losses within the non-potable system were assumed to be 23%, the average non-potable water loss from 2016 through 2020. Over the last five years, water losses within the non-potable system have ranged from 20 to 26%. Within the non-potable system, water is typically loss at the Jefferson Pump station. The Jefferson Pump station diverts water from the Riverside Canal, but due to operational constraints, some non-potable water flows to the River.

Table 10-3 summarizes the demand by service area while **Figure 10-6** and **Table 10-4** summarize the total projected Western Retail demand by customer class, in AFY.

Table 10-3. Projected Retail Water Demand by Service Area, AFY

SERVICE AREA	2025	2030	2035	2040	2045
Riverside	27,674	31,101	34,695	38,705	43,178
Riverside Potable	22,119	24,675	27,527	30,709	34,258
Riverside Non-Potable*	5,555	6,426	7,168	7,997	8,921
Murrieta	2,452	2,735	3,051	3,404	3,715
Rainbow	41	44	46	46	47
WESTERN RETAIL TOTAL	**30,167**	**33,879**	**37,792**	**42,155**	**46,940**

*Non-potable demands include demand met by recycled water. Western cannot distinguish between recycled water and non-potable deliveries as their system is combined.

Figure 10-6. Projected Retail Water Use by Customer Type, AFY

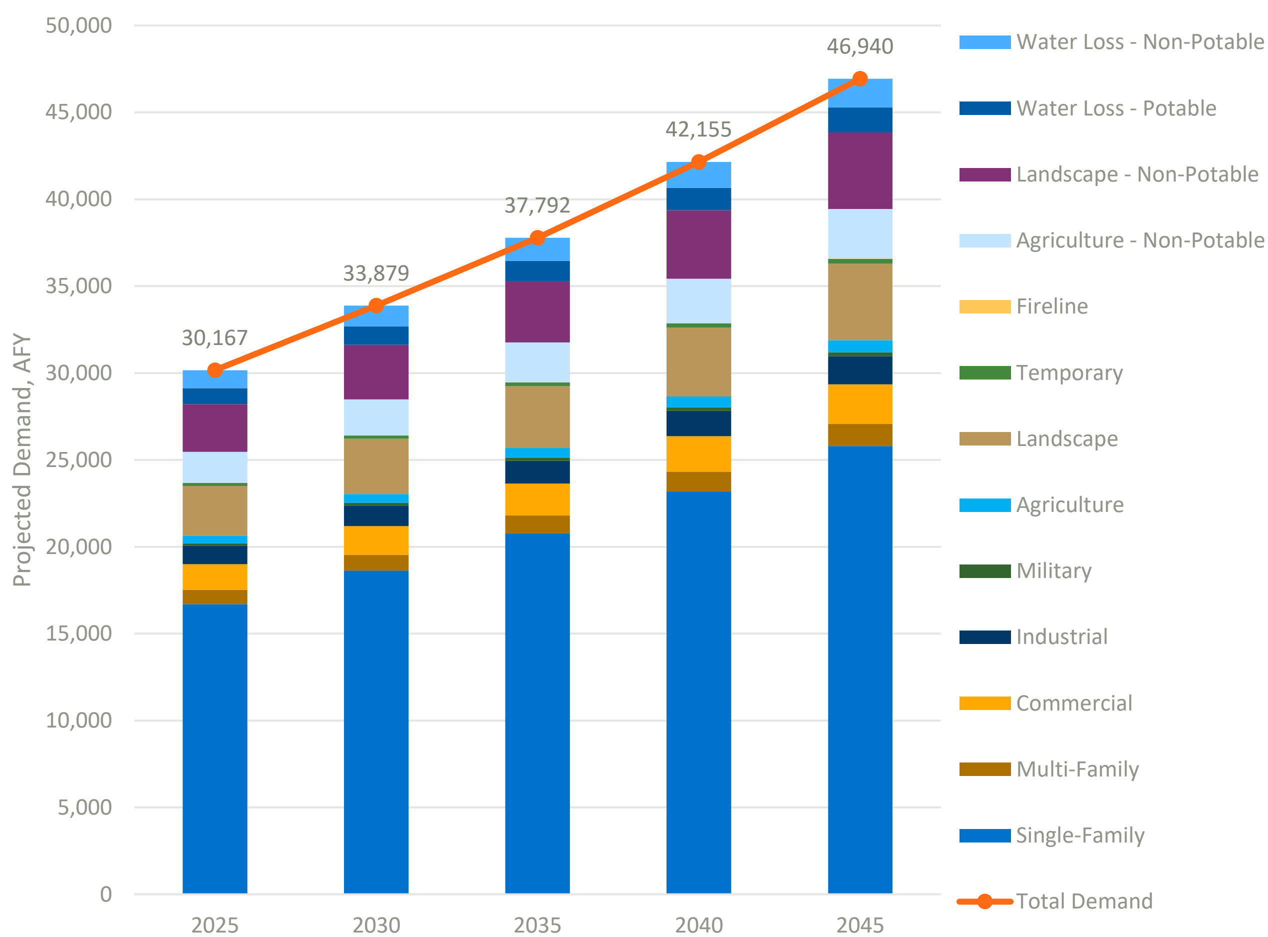


Table 10-4. Total Projected Demands for Water, AFY

PROJECTED WATER USE	2025	2030	2035	2040	2045
POTABLE					
Agriculture	443	494	551	615	685
Commercial	1,481	1,652	1,843	2,056	2,288
Single-Family	16,703	18,632	20,783	23,182	25,803
Landscape	2,859	3,189	3,557	3,968	4,417
Industrial	1,049	1,170	1,305	1,456	1,620
Military	148	165	184	205	228
Multi-Family	815	909	1,015	1,132	1,260
Temporary	177	198	220	246	274
Fireline	6	7	8	9	10
Losses - Potable	930	1,037	1,157	1,289	1,435
TOTAL POTABLE	**24,612**	**27,454**	**30,624**	**34,158**	**38,019**
NON-POTABLE*					
Agriculture – Non-potable	1,779	2,058	2,296	2,561	2,857
Landscape – Non-potable	2,737	3,166	3,532	3,940	4,396
Losses – Non-potable	1,039	1,202	1,340	1,495	1,668
TOTAL NON-POTABLE	**5,555**	**6,426**	**7,168**	**7,997**	**8,921**
TOTAL DEMAND	**30,167**	**33,879**	**37,792**	**42,155**	**46,940**

*Non-potable demands include demand met by recycled water. Western cannot distinguish between recycled water and non-potable deliveries as their system is combined.

Although Western's non-potable system includes recycled water, for the purposes of demand projection and future recycled water reporting, the estimated percentage of total non-potable demands met by recycled water was determined based on the 2020 supply ratio between recycled water and non-potable sources. In 2020, WWRF produced approximately 36% of the total non-potable supply that was used. As a result, it was assumed that 36% of non-potable demands were met by recycled water. To forecast future demands, it was assumed that recycled water supply from the WWRF would be used prior to local or imported non-potable water. Future non-potable demands are summarized in **Table 10-5** below.

Table 10-5.Non-Potable Demand, AFY

	2025	2030	2035	2040	2045
NON-POTABLE					
Agriculture	809	759	555	545	841
Landscape	1,767	1,867	1,792	1,924	2,380
NON-POTABLE DEMAND	**2,576**	**2,626**	**2,347**	**2,469**	**3,221**
RECYCLED WATER					
Agriculture	970	1,299	1,740	2,016	2,016
Landscape	970	1,299	1,740	2,016	2,016
RECYCLED WATER DEMAND	**1,940**	**2,598**	**3,481**	**4,032**	**4,032**
Losses - Non-Potable	1,039	1,202	1,340	1,495	1,668
TOTAL NON-POTABLE SYSTEM DEMAND	**5,555**	**6,426**	**7,168**	**7,997**	**8,921**

Estimating Future Water Savings

In 2018, the legislature enacted SB 606 and AB 1668, which provide for implementation of a water budget-based approach to establishing new urban water use objectives for water suppliers. The series of water use efficiency standards that will inform calculation of Western's new water use objective are still under development and will take effect in 2023. Once the new standards have been established, Western will reevaluate customer demands and identify approaches to comply with the new standard, which will be incorporated into the next UWMP prepared in 2025. Western is committed to promoting water use efficiency and will continue to implement a comprehensive set of programs intended to reduce customer demands and support sustainable use of regional water supplies.

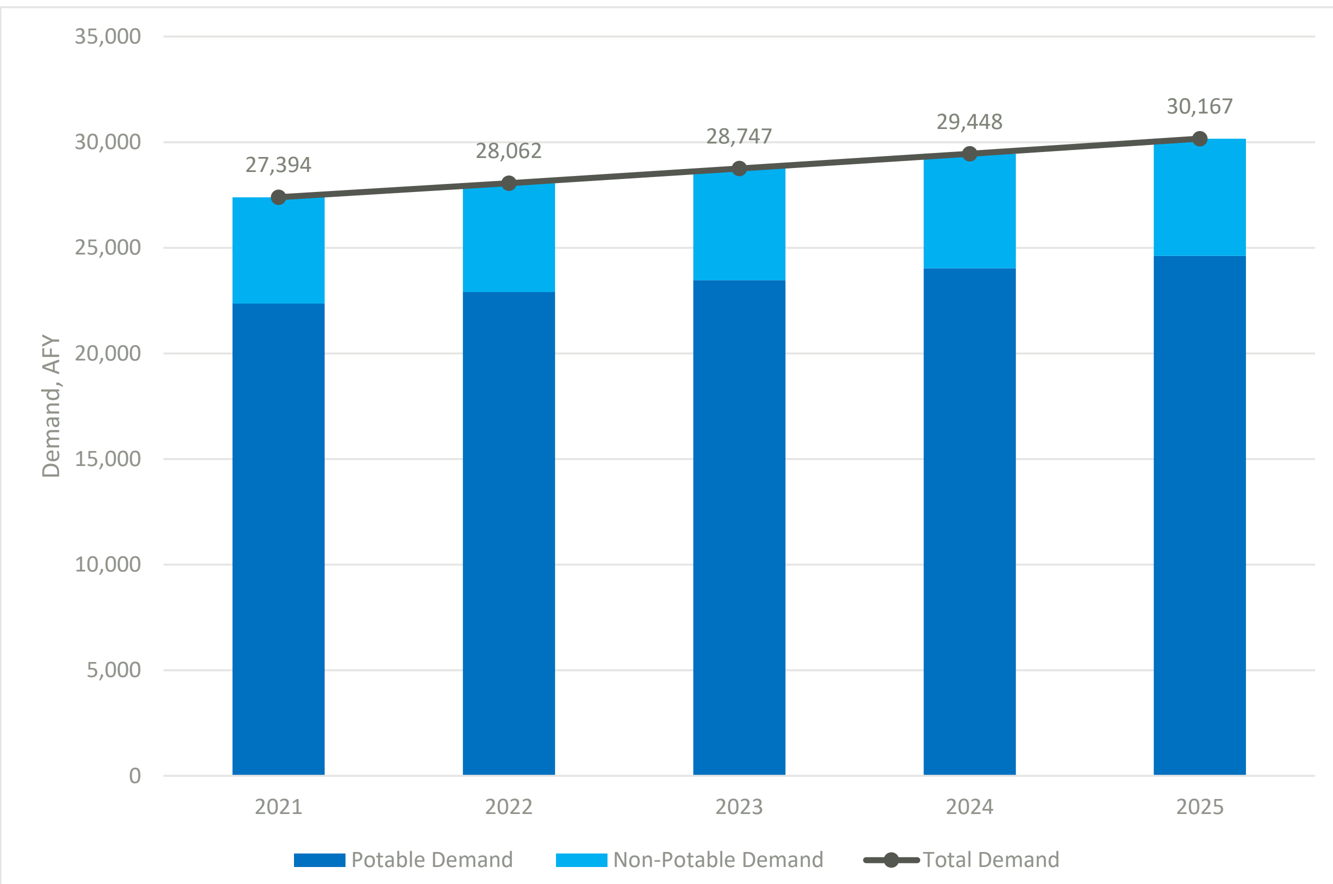
10.2.5 Characteristic Five-Year Water Use

In addition to past and projected uses, the UWMP more closely analyzes anticipated conditions for the next five years (2021 – 2025). Demands for the next five years are provided in **Table 10-6** and **Figure 10-7**. The demand projections established in this chapter assume typical, unconstrained demand, free from other influential factors like conservation savings. Based on the projections established above, Western anticipates that retail demands may increase by approximately 12% from actual 2020 use to projected use in 2025. Projected use in 2025 was determined using growth rates developed as part of master planning efforts. Details on an analysis for the next five years is discussed in **Chapter 13**.

Table 10-6. Projected Retail System Demand for the Next Five Years (2021-2025), AFY

	2021	2022	2023	2024	2025
Potable	22,361	22,904	23,460	24,029	24,612
Non-Potable	5,033	5,158	5,287	5,420	5,555
TOTAL DEMAND	**27,394**	**28,062**	**28,747**	**29,448**	**30,167**

Figure 10-7. Projected Retail Demand for the Next Five Years (2021-2025), AFY



10.3 Water Use for Lower Income Households

California Water Code 10631.1 requires that water use projections of an UWMP include the projected water use for low-income households as identified in the housing element of any city, county, or city and county in the service area of the supplier. Western retail areas fall within the city of Riverside, unincorporated Riverside County, and the city of Murrieta. Mapping showed that none of the low-income areas of the city of Riverside falls within Western's retail service areas.

The County of Riverside's 2014 Housing Element of its General Plan estimates that approximately 37.9 percent of all households in the western portion of Riverside County are "very low" or "low" income. The city of Murrieta's 2013 Housing Element of its General Plan estimates that 25 percent of all households in the city are "extremely low", "very low", or "low-income".

The GIS analysis completed as preparation for Western's 2015 UWMP showed that the portion of low-income households within Western's retail service areas are lower than county- or city-wide (RMC for Western Municipal Water District, June 2016). There are no low-income communities identified in the Rainbow Service Area, and small populations in both the Murrieta and Riverside Service Areas. The GIS analysis found that only 18 percent of the Riverside Service Area, and only 12 percent of the Murrieta Service Area qualifies as DAC using 2010-2014 American Community Survey (ACS) data.

The low-income household demands were calculated using Western's projections for single-family and multi-family water use and the percentage of the total retail service area that met the criteria for DACs based on the 2010-2015 ACS data, as shown in **Table 10-7**.

Table 10-7. Low Income Demands, AFY

	2025	2030	2035	2040	2045
Low Income Demand, AFY	3,068	3,091	3,117	3,145	3,170

10.4 SBX7-7 Baseline and Targets

Senate Bill x 7-7 (SB7) was incorporated into the Urban Water Management Planning Act (UWMP Act) in 2009 and requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita water consumption within the state by 20 percent by the year 2020. SB7 required the California Department of Water Resources (DWR) to develop certain criteria, methods, and standard reporting forms through a public process that could be used by water suppliers to establish their baseline water use and determine their water conservation targets. SB7 and the Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use (SB7 Guidebook) (California Department of Water Resources, February 2016) specify methodologies for determining the baseline water demand, 2015 interim urban water use target and the 2020 urban water use target for Western. Western utilized a 10-year baseline period from 1995 to 2004 and a five-year baseline period from 2003 to 2007 to determine the 2020 water use target. Western's baseline and 2020 target was calculated in the 2015 UWMP and has not changed for this plan. More details on the development of the baselines and target can be found in the 2015 UWMP and **Appendix N**. Western's final 2020 target water use was calculated as 352 GPCD.

Table 10-8. SBX7-7 Baseline and Targets Summary

BASELINE PERIOD	START YEAR	END YEAR	AVERAGE BASELINE GPCD*	CONFIRMED 2020 TARGET *
10-15 Year	1995	2004	430	352
5 Year	2003	2007	370	352

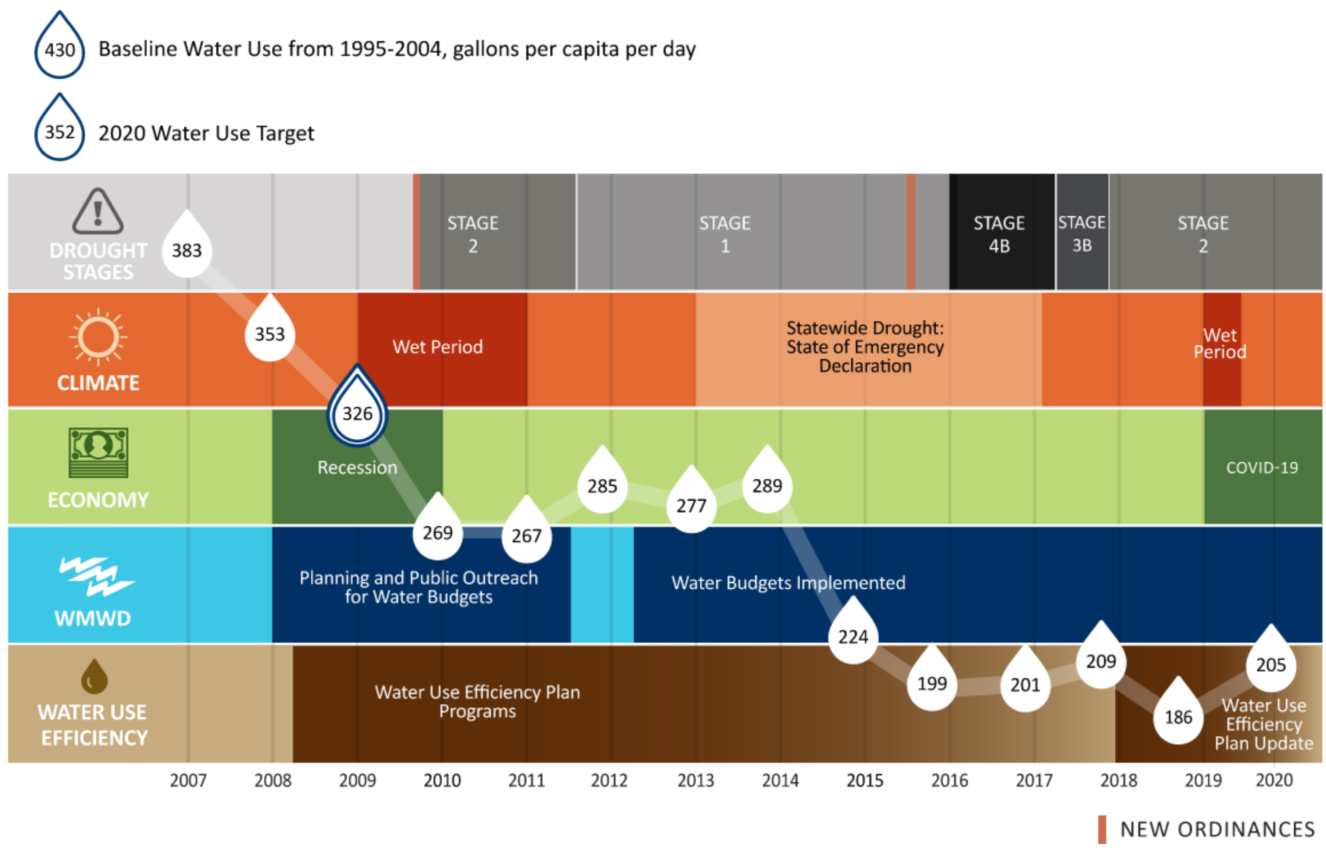
*All values are in Gallons per Capita per Day (GPCD)

10.4.1 2020 Compliance Daily Per-Capita Water Use (GPCD)

The calculated gpcd for 2020 is 205 gpcd, which meets Western's target of 352 gpcd by 2020. This is based on 2020 total potable retail water use of 21,831 AFY and a 2020 population estimate of 94,898 based on DWR's Population Tool.

By 2009, Western Retail had met their target to reduce per capita water consumption by 20% by 2020 and went on to achieve a reduction of more than 50% by 2020.

Activities that have affected retail water usage in Western Municipal Water District.



11

WESTERN MUNICIPAL WATER DISTRICT

Retail Water Service Reliability and Drought Risk Assessment

This chapter describes the reliability of Western's retail water supplies, which reflects Western's ability to meet the water needs of its retail customers with water supplies under varying conditions. The essential findings are that Western can reliably meet its retail demands with existing and future supply sources based on demand and supply projections.

Similar to **Chapter 6**, which focused on Western wholesale, this chapter describes the expected Western retail water supply reliability for normal, single dry year, and multiple-dry years through 2045 followed by a drought risk assessment for 2021 to 2025.

Western's work to expand and further diversify its retail supply portfolio is an important step toward improving the reliability of retail supplies. Western has also prepared a comprehensive Water Shortage Contingency Plan to provide reliability in the event of a water shortage, presented in **Appendix A**.

IN THIS SECTION

- Supply Constraints
- Water Service Reliability Assessment
- Drought Risk Assessment

11.1 Constraints on Water Sources

As described in **Chapter 10**, Western has various water supply sources available (groundwater, imported water, and recycled water) to meet retail demands during normal, single-dry, and multiple-dry years. These supply sources may be impacted by climatic and hydrologic conditions, water quality, and legal restrictions, as well as potential for interruption of supply driven by catastrophic events.

11.1.1 Imported Water Supply Reliability

Western retail obtains imported water supplies from Western wholesale. Imported water supply constraints are discussed in **Chapter 6,** Wholesale Water Service Reliability and Drought Risk Assessment.

11.1.2 Groundwater Supply Reliability

Western retail obtains groundwater supplies from several local groundwater basins. Each of the groundwater sources are adjudicated and closely managed by Watermasters and/or Groundwater Sustainability Agencies. Western plays a key role in the management of the groundwater basins it relies on to meet retail demands and participates in ongoing water conservation measures and regional recharge projects to enhance and protect the reliability of local groundwater.

Potential threats to groundwater supply reliability include:

Drought

The effects of a local drought are not immediately recognized since the local groundwater basins have substantial storage capacity to support continued use during dry periods. However, groundwater supply availability does become threatened when long term recharge and inflow decreases.

Overdraft

Under extended supply pressures, groundwater basins can enter overdraft conditions, which can have a series of consequences including subsidence. Overdraft can also exacerbate or create water quality issues by reducing the assimilative capacity of the basin or requiring wells to tap into lower quality water that may be present in other parts of the basin.

Climate Change

Climate change could increase the potential for overdraft by increasing demand, reducing other sources of supply, and reducing natural recharge and inflows from surface water and precipitation.

Regional Growth

Population growth could increase demands on groundwater supplies, potentially creating risk of overdraft. Regional growth could also increase the amount of contaminants entering groundwater basins, either as a result of increased urban runoff or industrial or other activities. Growth can also impact recharge areas by expanding impervious surfaces into areas that would otherwise represent entry points for surface water recharging local aquifers.

Water Quality

Some water quality issues are naturally occurring, while others are a result of human actions. Decreased quality of groundwater poses threats to supplies that can be mitigated but require additional costs to treat. Based on current conditions, water quality is not expected to affect Western retail's supply reliability.

Due to the availability of groundwater storage and the sustainable management of local groundwater sources, Western's groundwater supplies are generally considered reliable, even in the face of the constraints identified here.

11.1.3 Recycled Water Supply Reliability

Western's recycled water supply is not expected to be affected by climatic factors because source wastewater flows coming from indoor use are generally not impacted by temperature and precipitation. Recycled water supplies will increase with growth; however, reduced urban water use standards currently under development could result in reduced recycled water supplies.

11.2 Water Service Reliability Assessment

This section presents Western's expected retail water supply reliability for a normal year, single dry year, and five consecutive dry years, including projections for 2025, 2030, 2035, 2040, and 2045.

11.2.1 Year Type Characterization

The water service reliability and Drought Risk Assessment analyze supply over several water years: normal, single dry, and multiple dry years. Local groundwater and recycled water supplies are not expected to change under the various year types, so Western has elected to use the same years identified by Metropolitan for normal, single-dry, and multiple-dry years for both imported and local supplies in this retail supply reliability analysis. DWR defines these years as:

Normal Year

This represents the water supplies a supplier considers available during normal conditions. This could be a single year or averaged range of years that most closely represents the average water supply available. Metropolitan uses an average from 1922 to 2017 to establish normal year supply availability.

Single Dry Year

The single dry year is recommended to be the year that represents the lowest water supply available. Metropolitan has identified 1977 as the single driest year.

Five-consecutive Dry Year

This represents the driest five-year historical sequence for the Supplier, which may be the lowest average water supply available for five years in a row. Metropolitan has identified 1988 through 1992 as the greatest 5-year drought period.

Due to Western's aggressive and highly successful conservation program, demands are assumed to be nominal in single and multiple dry years. As discussed in **Chapter 10**, Western retail can purchase additional imported water from Western wholesale if needed.

Table 11-1. DWR 7-1R Basis of Water Year Data (Reliability Assessment)

YEAR TYPE	BASE[1] YEAR	AVAILABLE SUPPLY IF YEAR TYPE REPEATS
		PERCENT OF AVERAGE SUPPLY
Average Year	1922-2017	
Single-Dry Year	1977	100%
Consecutive Dry Years 1st Year	1988	100%
Consecutive Dry Years 2nd Year	1989	100%
Consecutive Dry Years 3rd Year	1990	100%
Consecutive Dry Years 4th Year	1991	100%
Consecutive Dry Years 5th Year	1992	100%

[1]Applies to both imported and local supplies

11.2.2 Water Service Reliability

Normal supply and demand projections were developed in **Chapter 9** and **Chapter 10** and form the basis of this reliability analysis.

As described in this UWMP, Western prioritizes the use of local supply sources and uses imported water to meet the remaining retail water demands that are not met by local supplies. Retail potable demands exceed local supplies so imported water is used to meet the balance of retail demands. Western retail also does not currently use water from the Chino Desalter, as that water is currently leased to Jurupa Community Services District and is therefore shown as retail surplus within this chapter. It is anticipated that Western retail's shares of the Chino Desalter will continue to be leased to Jurupa Community Services District over the planning period.

For the retail non-potable system, Western's local non-potable supplies are projected to exceed the projected non-potable demand in 2030 through 2040. In 2025 and 2045, non-potable demands are projected to exceed local non-potable supplies so imported water will be used the meet the difference. Western retail may theoretically obtain water from WRCWRA; however, no existing infrastructure exists to convey recycled water from WRCWRA to retail service areas and WRCWRA supply is included in the surplus non-potable supply amounts. In the future, Western anticipates leasing WRCWRA recycled water to other interested agencies.

Local groundwater and recycled water supplies are not expected to be reduced in dry years. As discussed in **Chapter 4**, Metropolitan's 2020 UWMP projects the ability to meet projected imported water demands under normal, single dry year, and multiple dry year conditions and Western wholesale projects a surplus of imported water supplies that are available to Western retail if needed. **Table 11-2**, **Table 11-3** and **Table 11-4** demonstrate that Western anticipates adequate supplies for years 2025 to 2045 to meet retail demand under normal, single dry and multiple-dry year conditions.

Water Service Reliability – Normal Year

Table 11-2. Retail Normal Year Supply and Demand Comparison, AFY

	2025	2030	2035	2040	2045
POTABLE					
Supply	27,073	30,199	33,686	37,574	41,821
Demand	24,612	27,454	30,624	34,158	38,019
DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
NON-POTABLE					
Supply	7,031	8,066	8,964	9,966	11,079
Demand	5,555	6,426	7,168	7,997	8,921
DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**

Water Service Reliability – Single Dry Year

Table 11-3. Retail Single Dry Year Supply and Demand Comparison, AFY

	2025	2030	2035	2040	2045
POTABLE					
Supply	27,073	30,199	33,686	37,574	41,821
Demand	24,612	27,454	30,624	34,158	38,019
DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
NON-POTABLE					
Supply	7,031	8,066	8,964	9,966	11,079
Demand	5,555	6,426	7,168	7,997	8,921
DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**

Water Service Reliability – Five Consecutive Dry Year

Table 11-4. Retail Multiple Dry Year Supply and Demand Comparison, AFY

		2025	2030	2035	2040	2045
FIRST YEAR	**POTABLE**					
	Supply	27,073	30,199	33,686	37,574	41,821
	Demand	24,612	27,454	30,624	34,158	38,019
	DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
	NON-POTABLE					
	Supply	7,031	8,066	8,964	9,966	11,079
	Demand	5,555	6,426	7,168	7,997	8,921
	DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**
SECOND YEAR	**POTABLE**					
	Supply	27,073	30,199	33,686	37,574	41,821
	Demand	24,612	27,454	30,624	34,158	38,019
	DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
	NON-POTABLE					
	Supply	7,031	8,066	8,964	9,966	11,079
	Demand	5,555	6,426	7,168	7,997	8,921
	DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**
THIRD YEAR	**POTABLE**					
	Supply	27,073	30,199	33,686	37,574	41,821
	Demand	24,612	27,454	30,624	34,158	38,019
	DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
	NON-POTABLE					
	Supply	7,031	8,066	8,964	9,966	11,079
	Demand	5,555	6,426	7,168	7,997	8,921
	DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**

*Table continues on the next page.

		2025	2030	2035	2040	2045
FOURTH YEAR	POTABLE					
	Supply	27,073	30,199	33,686	37,574	41,821
	Demand	24,612	27,454	30,624	34,158	38,019
	DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
	NON-POTABLE					
	Supply	7,031	8,066	8,964	9,966	11,079
	Demand	5,555	6,426	7,168	7,997	8,921
	DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**
FIFTH YEAR	POTABLE					
	Supply	27,073	30,199	33,686	37,574	41,821
	Demand	24,612	27,454	30,624	34,158	38,019
	DIFFERENCE	**2,461**	**2,745**	**3,062**	**3,416**	**3,802**
	NON-POTABLE					
	Supply	7,031	8,066	8,964	9,966	11,079
	Demand	5,555	6,426	7,168	7,997	8,921
	DIFFERENCE	**1,476**	**1,640**	**1,796**	**1,969**	**2,158**

11.2.3 Description of Management Tools and Options

Western has made significant investments in local supply sources to reduce reliance on imported water, improve reliability and reduce costs associated with imported water. Western will remain committed to increasing retail water reliability through investments in local supplies and implementation of a comprehensive conservation program.

11.3 Drought Risk Assessment

The retail Drought Risk Assessment (DRA) focuses on a drought scenario that could potentially occur within the next five years (2021-2025).

11.3.1 Data, Methods, and Basis for Water Shortage Condition

The data, methods, and basis for a water shortage condition were identified using typical normal year supply and demand, as developed in **Chapter 9** and **Chapter 10**. To estimate demands for 2021 through 2025, a straight-line interpolation was applied from the 2020 demand to the 2025 projected demand. The demands for the DRA's five-consecutive dry years were based on the normal demand and assume that demands will not increase in dry years due to Western's aggressive and highly successful conservation program.

The DRA provides a snapshot of the anticipated surplus or deficit if a drought were to occur in the next five years.

11.3.2 DRA Water Source Reliability

As mentioned in this chapter, local resources are not expected to reduce in dry years and will continue to meet the majority of Western's retail demand. Imported water will be used to meet the balance of demands. As described in **Chapter 6**, Metropolitan anticipates a potential shortage in 2021 and 2023 and will implement response actions, including drawing water from storage, to meet anticipated demands. With a potential surplus estimated for years 2022, 2024, and 2025, no water service reliability concern is anticipated, and no shortfall mitigation measures are expected to be exercised by Metropolitan. Based on the results of Metropolitan's DRA, this DRA assumes that Western retail will be able to purchase sufficient supplies to meet retail demands in excess of local supplies. Western does not anticipate the need to implement shortage response actions in its retail WSCP in the next five years, unless Metropolitan implements a WSAP, which is not expected based on Metropolitan's DRA analysis.

Table 11-5. Retail DRA Results, AFY

	2021	2022	2023	2024	2025
POTABLE					
Gross Water Use	22,361	22,904	23,460	24,029	24,612
Total Supply	26,193	24,299	24,406	24,513	25,121
DIFFERENCE	**3,832**	**1,395**	**946**	**484**	**509**
NON-POTABLE					
Gross Water Use	5,033	5,158	5,287	5,420	5,555
Total Supply	7,253	7,378	7,507	7,640	7,775
DIFFERENCE	**2,220**	**2,220**	**2,220**	**2,220**	**2,220**

12 WESTERN MUNICIPAL WATER DISTRICT
Retail Demand Management Measures

This chapter describes Western's implementation of retail demand management measures (DMMs) intended to promote water-use efficiency and partner with local communities to support sustainable use of regional water supplies.

IN THIS SECTION

- Water Waste Prevention Ordinance
- Public Education and Outreach
- Rebates
- Implementation over the Last Five Years

Western has actively implemented a conservation program since 2009 and is a regional leader for advancing water efficiency. Western actively collaborates with local and regional agencies and the communities it serves to implement innovative programs and drive change. Western staff also serves in a leadership role for the California Water Efficiency Partnership (CalWEP) whose mission is to maximize urban water efficiency and conservation throughout California by supporting and integrating innovative technologies and practices; encouraging effective public policies; advancing research, training, and public education; and building collaborative approaches and partnerships. Western leverages these partnerships, tools, and resources within their service area.

In order to meet the future demand for water in Western's service area, implementation of new supply projects must be coupled with an expectation of greater water use efficiency by all retail customers. Water use efficiency has become a core business component in Western's customer partnership, with the understanding that water efficiency enables continued economic development and maintenance of the local living environment.

In response to growing concerns regarding the reliability of imported water supplies and the need for increased water-use efficiency, Western first developed and implemented a Water Use Efficiency Master Plan (WUEMP) in 2008 and revised it in 2018. The 2018 WUEMP is included in **Appendix O**. The plan outlines potential programs, partnerships, and messaging research to raise customer awareness about water-use efficiency. It assists customers within Western's retail service area in becoming water efficient and embeds water-use efficiency into Western's policies and customer behavior.

The majority of Western's urban water use is for landscape and outdoor irrigation; therefore, Western has focused its water conservation activities on this sector for the largest and most cost-effective savings.

Western implements a comprehensive set of retail DMMs intended to reduce customer demands and help Western maintain supply reliability. The DMMs also help Western achieve its water use efficiency targets. Details on Western's retail DMMs are provided in the following sections. DMMs implemented for Western's wholesale system is described in **Chapter 7**.

12.1 Water Waste Prevention Ordinances

In February 2015, Western's Board of Director's adopted Ordinance No. 384, which updated the Water Supply Shortage Contingency Program. The update established permanent water use prohibitions to be in effect at all times under Stage 1 – Water Supply Watch, unless otherwise declared by the Board. Under a Stage 1 condition, customers are encouraged to use water efficiently and all uses of water must be reasonable and beneficial. It also prohibits waste, unreasonable use, unreasonable method of use, or unreasonable method of diversion of water. These prohibitions remain in effect under all levels of water shortage contingency declaration in addition to the specific requirements of each level. Each level of the Water Supply Shortage Contingency Program increases in stringency, providing for increasing water conservation during time of water supply shortage. Western's Water Shortage Contingency Plan includes a detailed description of all water waste prohibitions established in Ordinance No. 384. The WSCP is attached as **Appendix A** and summarized in **Chapter 13**.

12.1.1 Metering

All of Western's connections are metered and billed monthly with a water budget rate structure. Western adopted a water budget rate structure in 2011. Water budgets are designed for each customer and include an indoor daily gallons per capita component, as well as an outdoor volume based on landscaped area and parameters established in the State Landscape Model Ordinance.

Western also has a meter testing and replacement policy consisting of the following three parts:

Western uses the customer billing system to track all installed meters by size, type, date installed, customer account type, and warranty information.

Western has a yearly testing program of all meters for the wholesale division and all large meters over 3-inch. These meters are tested annually, and all necessary repairs are performed to maintain AWWA accuracy, based on meter calibration results.

Western periodically samples its residential meter stock to ensure accuracy. As a result of the most recent sampling, it was determined that meters over 15 years old should be replaced. Starting in 2020, Western replaced over half of its residential meters with AMI enabled meters and will have replaced nearly all residential meters by the end of 2021. Western has also implemented a project to install a Meter Data Management System to aid in meter data analysis and a customer portal to help customers track their use.

12.1.2 Conservation Pricing

Western charges water budget rates for all its connections. When customers regularly remain under their water budget, they are billed at the lowest rates available. Customers who use water in excess of their water budgets are billed at higher rate tiers. Western works closely with customers who exceed their water budgets to reduce their water use and associated costs.

12.2 Public Education and Outreach

Western implements a comprehensive Public Education and Outreach program within its retail service area.

12.2.1 Public Outreach

Western's Strategic Communications department provides informational materials to customers through their website, media events, landscape conservation campaigns, and other educational programs. Western also communicates with its customers through newspaper articles, paid advertising, bill inserts, its website (**http://www.wmwd.com/**) and public service announcements. Conservation messages are also included on customer water bills.

As part of the Water-Use Efficiency Master Plan, Western has developed several high-quality outreach pieces to help customers. The first is the SoCal Yard Transformation book, a comprehensive guide to everything you need to know to replace your lawn with drought-tolerant plants. As a companion piece, Western developed the Landscape Style Guide, a coffee table book of designs to help customers choose the style of their yard. Western also developed a Customer Welcome Packet that goes out to all new or move-in customers. The packet welcomes customers to Western and provides everything they need to know about their rates, bills, and water sources.

12.2.2 School Education Programs

Western implements school education programs for its retail area in conjunction with its wholesale area programs, as described in **Chapter 7**. Programs include presentations, field trips and assemblies for grades K-12. Any materials distributed comply with state standards. The materials distributed to students in grades K-6 include a water cycle bracelet, an earth ball, water story rock, and assembly-related material. Students in grades 7-12 receive scout badges, sponsorships, and assembly program-related material. Within Western's retail service are 14 public schools which are eligible to participate in the education programs offered. Western partners with the Discovery Science Center (**http://www.discoverycube.org/**) for its Water Education Assembly Programs for fourth and fifth graders. Western also funds water-related class field trips (virtual and in person) to the Chino Wetlands and the Santa Ana River.

12.3 Programs to Assess and Manage Distribution System Real Losses

Western repairs all reported leaks and breaks to the extent cost effective. In FY 2010, Western started calibrating all large commercial customers with meters 3" and above. In FY 2014, Western started a formal system audit, leak detection and repair program within its retail service area.

Western has completed annual water loss audits since 2015, in accordance with the AWWA guidelines. A copy of past water audits is provided in **Appendix P**.

Western's Finance department carefully tracks water losses each year. This data is used in the annual water loss audits and is also used to determine whether additional water loss interventions are warranted and whether a component analysis is needed.

12.4 Water Conservation Program Coordinating and Staffing

Western has maintained a full-time water conservation coordinator position since 1990. The water conservation coordinator implements retail area programs.

12.5 Other Demand Management Measures – Rebate Programs

Western offers various programs to its residential customers to help them reduce and manage their water use. Western offers rebates to its residential customers through Metropolitan's SoCal WaterSmart program. Additional information on the residential rebates provided by the SoCal WaterSmart Program can be found at **https://socalwatersmart.com/en/residential/** or through Western's website at **https://www.wmwd.com/411/Rebates**. Western also publishes an Annual Rebate Report for each fiscal year that summarizes the number of rebates and cost to implement as well as the expected annual and lifetime savings resulting from each rebate.

Landscape Evaluations (Norris Evaluations)

Shortly following the adoption of the District's WUEMP in 2008, Western began offering retail water customers a free landscape evaluation through a contract with Tim Norris Consulting. Mr. Norris, who holds a degree in irrigation science from Cal Poly Pomona, is highly knowledgeable in the science of proper irrigation system design and very adept at the art of communicating with customers at a level that is easily understood.

The evaluation program has become the foundation of Western's programmatic offering and serves to funnel water users to the other opportunities for increased water use efficiency, such as turf replacement or the regional rebate programs administered by Metropolitan.

The evaluation program has become an extension of both the customer service and the efficiency teams. Customers concerned with a high-water bill or simply seeking to ensure they remain within their water budget can request a free evaluation by contacting Customer Service. Staff provide customer contact information and historic water use data to Norris Consulting. The contractor then schedules an appointment at a time when the customer can be present at their home. During the scheduled appointment, the contractor reviews the irrigation system looking for errors in irrigation scheduling and watering issues. The most common issues observed and reported to customers have been incorrect irrigation scheduling and irrigation problems such as a damaged sprinkler heads and broken irrigation lines. Recommendations provided in the written report for these issues include adjusting the irrigation schedule according to season or current weather conditions and performing monthly system checks to minimize the time an issue remains uncorrected. The public relations value of this program is immeasurable.

Norris evaluations comprise of two components: Irrigated landscape area measurement and an irrigation and landscape audit. Under the irrigated landscape area measurement, the consultant, Norris, confirms meter number on meter lid and GPS meter location, uses a measure wheel to measure irrigated landscape, photographs the site and visually estimates percent of turf, trees, shrubs, and hardscape, obtains customer related information like persons per household (PPH) and slopes, and provides the customer a Water Budget adjustment form, if applicable.

The irrigation and landscape audit is a more detailed evaluation based on procedures published using the Irrigation Training and Research Center and the Irrigation Association. Norris confirms meter number on meter lid and GPS meter location, documents controller type, station, and schedule, and turns on valves from controllers, identify and document system issues: leaks, broken, misaligned, mismatched heads, pressure problems, spray deflection, sunken heads, plugged equipment, dry spots, wrong sized heads or emitters. In addition, Norris takes photos, identify microclimate, plant material, soil type, and slopes. Norris logs the irrigated areas, measures the square footage by vegetation type, estimates distribution uniformity, and measures pressure at head using a pitot tube. The end result is a generated seasonal irrigation schedule and a list of system issues.

For July 1, 2019 – December 31, 2019, 12 customers participated in a landscape evaluation, with an estimated cost to WMWD of $1,575 and estimated average acre-feet (AF) of water saved over a 5-year lifetime of 4 AF. Due to COVID-19, January 1, 2020 – June 30, 2020 had less participation in physical evaluations. Virtual audits were offered, but the water savings attributed to a virtual audit is unknown and has been excluded from this analysis. Participation numbers for January 1, 2020 – June 30, 2020 were not available at the time of this report.

Toilets (HET)

A premium high-efficiency toilet is a toilet that uses less water than what used to be considered a water-saving toilet. These toilets flush at a rate of 1.1 gallons per flush (gpf) or less. Eligible toilets must replace existing toilets using 1.6 gallons per flush or more. Premium high-efficiency toilets use almost 20% less water than the WaterSense standard and flush the same amount of waste just as, if not more effectively.

Water savings from high-efficiency toilets can save over $800 on a customer's water bill over the lifetime of the product. When combined with SoCal Water$mart rebates, premium high-efficiency toilet upgrades can pay for themselves. The qualifying premium high-efficiency models available for a rebate have been performance tested and certified through MaP testing, an independent testing program.

For FY 2019 – 2020, 4 high efficiency toilet rebates were paid, with an estimated cost of $360 and estimated average acre-feet (AF) of water saved over a 10-year lifetime of 5 AF. Two of the high efficiency toilet rebates were obtained by customers in the Murrieta Service Area.

High Efficiency Clothes Washer (HECW)

As a Metropolitan Water District of Southern California's Member Agency, customers in Western Municipal Water District (WMWD) service area can receive high-efficiency clothes washer rebate for their residential homes. Rebates are limited to a single rebate per installation address.

SoCal Water$mart manages the rebate program, and they state that a high-efficiency clothes washer uses 55% less water than standard clothes washers, reducing water use by over 11,000 gallons a year. Other benefits are that these washers last longer and are energy efficient.

For FY 2019 – 2020, 88 high efficiency clothes washer rebates were paid, with an estimated cost to Metropolitan of $7,480 and estimated average acre-feet (AF) of water saved over a 10-year lifetime of 73 AF. 18 of the high efficiency clothes washer rebates were obtained by customers in the Murrieta Service Area.

Weather Based Irrigation Controllers (WBIC)

Weather-based irrigation controllers (WBICs), also known as "smart sprinkler controllers," allow for more accurate, customized irrigation by automatically adjusting a customer's landscape irrigation schedule and water use in response to changing conditions. State-of-the-art WBIC technology allows customers to tailor their irrigation schedule to meet a landscape's specific design, soil conditions and plant types, while also responding to local changing weather conditions.

For FY 2019 – 2020, 117 weather-based controller rebates were paid, with an estimated cost to MWD of $11,062 and estimated average acre-feet (AF) of water saved over a 10-year lifetime of 77 AF. Twenty-six of the weather-based controller rebates were obtained by customers in the Murrieta Service Area.

Turf Replacement

Starting in 2009, Western Municipal Water District offered its retail customers an opportunity to participate in a Turf Replacement Program. The Turf Replacement Program was designed to help customers offset the costs associated with converting turfgrass to a climate appropriate landscape.

The program took part in three phases, where from 2009 to 2014, the rebate offered ranged from $0.40-$1.00/square foot (sqft), and from 2014 to 2015, the rebate offered was $2.00/sqft. The rebate amount available in 2019 was $3.00/sqft.

To have qualified for the program, customers needed to be the property owner and in good standing with Western for at least twelve (12) months. Landscape that qualified for the conversion needed to have living turfgrass lawn before the removal.

To receive their incentive payment, all sites needed to be inspected and approved prior to the landscape conversion and after the conversion was complete. The program also did not apply retroactively.

The program provided guidelines for what would count as a climate appropriate landscape. At a minimum, thirty-five percent (35%-50%) of the site must be landscaped and/or mulched with at least a two (2) inch layer of organic or inorganic mulch. The remaining portion must be covered with permeable materials.

Participants were also provided with a list of pre-approved climate appropriate plants. Participants were required to convert irrigation systems to drip, microspray, and/or bubblers.

In addition, the rebate could only be used for documented material costs, such as those expenses for the purchase of plant materials, mulch, and irrigation components which are documented with detailed store receipts. All other expenses such as design services, labor, transportation, etc. were ineligible.

The Turf Replacement Program currently is offered at $2/sqft from MET and an additional $1/sqft from Western for FY 2019 – 2020. 30 turf rebates were paid out, $46,559 from Western and $93,946 from MET for a total of $140,505. Approximately 46,973 square feet of turf was removed.

12.5.1 Past Rebate Programs

Large Landscape Program

The Large Landscape Program, a direct installation program, was designed to utilize a Western contractor for direct installation of smart controllers and high efficiency nozzles at residential sites with irrigated landscapes greater than 1 acre.

This component was designed to target Western's highest residential water use customers through use of GIS mapping to identify parcels. Program staff was to compare parcel size with usage information to pinpoint the sites with the highest potential for savings.

The contractor was responsible for marketing the program to targeted customers, auditing the irrigated landscape, and installing the product. A follow-up site visit by the contractor or Western was to be conducted. The purpose of the site visit was to verify the installation, therefore ensuring that water savings are maximized, and customer issues reduced.

Smart Yard

In 2010, Western began implementing Smart Yard™, a community water conservation program designed to achieve more sustainable water use throughout Western's retail customer base.

Western's overall goals of the program was to reduce the water consumption of the Smart Yard™ participants and overall save more than one billion gallons of water over a 10-year period. To accomplish this, Western partnered with HydroPoint Data Systems, Inc., provider of the WeatherTRAK® Smart Water Management solution, to manage the innovative water conservation program.

The program provided homeowners with a landscape water audit and installation of a customized WeatherTRAK smart controller. Research in 23 agency studies found that this controller was proven to conserve water. Western rebated 50 percent of product and installation costs, ranging from $599 to $1,139 per home, depending on the smart controller model required for the landscape. Participating homeowners had to pay the balance with zero-interest financing from Western, which placed a fixed fee starting at $9.99 on their monthly water bills for 5 years. Western's Smart Yard program was designed to save customers significantly more money in water costs than they pay in the monthly fee.

The primary targets were residential homeowners with between 0.25 and 0.99 acre lots, high water use accounts, both commercial and residential, within the direct retail service area.

12.5.2 Commercial, Industrial, and Institutional Programs

Western offers a variety of programs to its Commercial, Industrial, and Institutional customers to help manage and reduce their demands. Many of these programs overlap with residential programs or provide the same or similar services.

Commercial, industrial, and institutional rebate programs include:

- Premium high-efficiency toilets
- Ultra-low and zero water urinals
- Plumbing flow control valves
- Weather-based irrigation controllers (WBICs)
- Rotating nozzles for pop-up spray heads
- Large rotary nozzles
- In-stem flow regulators
- Soil moisture sensor systems
- Turf replacement

12.5.3 Regional Programs

In addition to the programs offered specifically to individual customers, Western supports several regional programs.

Master Gardeners of Riverside County

Master Gardener volunteers are trained by the University of California Cooperative Extension to provide the gardeners of Riverside County with research-based information to promote environmentally responsible and sustainable horticultural practices. The Master Gardeners hold free monthly workshops fall through spring at Western.

Green Plumbers

Green Plumbers is an innovative, national training and accreditation program that assists plumbers in understanding their role in the environment and public health. The organization's goal is to train and deploy a green army of thousands of plumbers to promote the benefits of water conservation and the reduction of GHG emissions. The focus is on changing consumer and plumbing behavior through the use of energy efficient and water saving technologies.

Qualified Water Efficient Landscaper Program - QWEL

The Qualified Water Efficient Landscaper Program (QWEL) trains landscapers in water-wise landscape practices. QWEL provides approximately 20 hours of education focused on water efficient principles including irrigation system and landscape design with proper plat selection for the region's climate. Details are available at **https://www.qwel.net/**.

12.5.4 Large Landscape Conservation Programs and Incentives

In the fall of 2011, Western adopted a budget-based water rate structure which includes a component for outdoor water use based on landscaped area and parameters established in the State Landscape Model Ordinance.

In 2009, Western, in partnership with the Riverside County Water Task Force, developed the Riverside County Landscape Water Use Efficiency Ordinance. As of January 2010, this ordinance had been adopted by the County of Riverside and the Cities of Corona, Canyon Lake, Lake Elsinore, Menifee, Moreno Valley, Murrieta, Perris, Riverside, and Temecula. This ordinance was updated in 2015 and Western will continue to encourage its adoption. The ordinance:

- Establishes a structure for planning, designing, installing, maintaining, and managing water-efficient landscapes in new construction and rehabilitated projects;
- Requires that landscapes not exceed a maximum water demand of fifty percent of its reference evapotranspiration (ETo) or any lower percentage as may be required by water purveyor policy or state legislation;
- Requires setting a Maximum Applied Water Allowance for new construction and existing landscapes, based on reference evapotranspiration.
- The water-efficient landscape requirements contained in this Ordinance shall be applicable to all rehabilitated landscapes associated with residential uses (including single family and multi-family units/projects) with a total landscape area equal to or greater than 2,500 square feet which require a discretionary permit and/or approval; all new landscapes associated with residential uses (including single family and multi-family projects) which require a discretionary permit and/or approval; and all new and rehabilitated landscapes associated with commercial or industrial uses which require a discretionary permit and/or approval.

Dedicated irrigation meters have had water budgets since October 2011 and have been charged using an allocation-based water pricing structure since implementation. Western continues to:

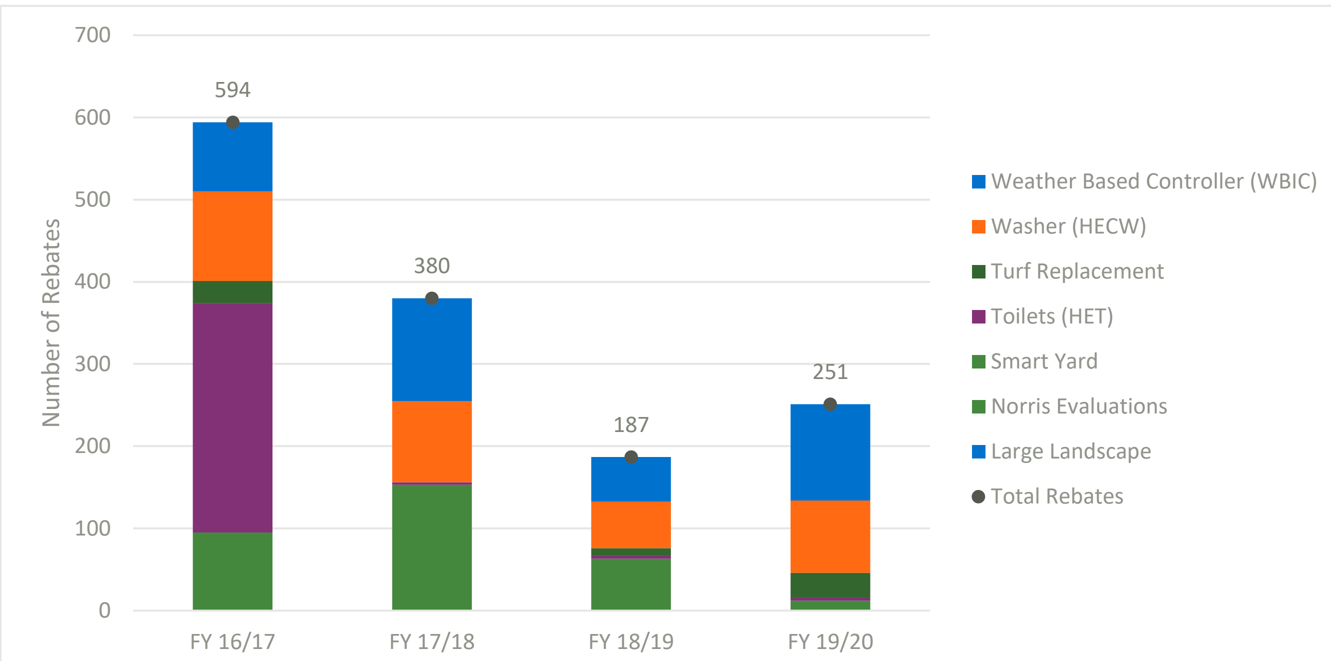
- Target non-dedicated irrigation meter accounts;
- Establish water budgets for those accounts with dedicated irrigation meters;
- Establish an allocation-based conservation water pricing structure.

12.6 Implementation over the Past Five Years

To date, there have been over 7,363 rebates paid to Western's retail customers and over $3.4 million invested in rebates.

In FY 2019/2020, Western achieved water savings of approximately 33 AFY from rebate programs. Western estimates that this equates to a lifetime savings of 249 AF, bringing the cumulative lifetime water savings total to 9,091 AF for all water efficiency rebate activities Western has implemented since 2009 (Western Municipal Water District, 2020). The number of rebate programs utilized in the past five years is summarized in **Figure 12-1**.

Figure 12-1. Past Rebate Information



12.7 Implementation to Achieve Water Use Targets

For decades, Western has valued and promoted conservation and will continue to do so. As a result, Western's customers continue to decrease their water use. Western will continue to pave the way for regional conservation and continue to implement existing conservation programs and explore additional programs to avoid substantial increases in demands.

12.8 Water Use Objectives (Future Requirements)

Western will continue to help their customers become water efficient and reduce their gallons per capita per day (gpcd) consumption. Western will evaluate additional measures if needed once future water use efficiency standards are established.

13 WESTERN MUNICIPAL WATER DISTRICT
Retail Water Shortage Contingency Plan

The WSCP is a strategic plan that Western uses to prepare for and respond to foreseeable and unforeseeable water shortages. This chapter provides an overview of the portions of Western's Water Shortage Contingency Plan that are applicable to Western Retail. The standalone Water Shortage Contingency Plan is included in Appendix A.

The California Water Code Section 10632 requires that every urban water supplier that serves more than 3,000 acre-feet per year or has more than 3,000 connections to prepare and adopt a standalone Water Shortage Contingency Plan (WSCP) as part of its UWMP. Western Wholesale and Western Retail are subject to the WSCP requirements and a single WSCP has been developed to meet the requirements for both systems.

IN THIS SECTION

- WSCP Outline
- Retail WSCP Requirements Overview

This chapter provides an overview of the portions of the WSCP that are applicable to Western Retail. Chapter 10 provides an overview of the portions of the WSCP that are applicable to Western Wholesale. Western's WSCP is included as **Appendix A** and will be separately submitted to DWR by July 1, 2021. The WSCP is developed separately from Western's 2020 UWMP and can be amended, as needed, without amending the UWMP.

The WSCP is a strategic plan that Western uses to prepare for and respond to foreseeable and unforeseeable water shortages. A water shortage occurs when water supply available is insufficient to meet the normally expected customer water use at a given point in time. A shortage may occur due to a number of reasons, such as water supply quality changes, climate change, drought, regional power outage, and catastrophic events (e.g., earthquake). Additionally, the State may declare a statewide drought emergency and mandate that water suppliers reduce demands, as occurred in 2014. The WSCP serves as the operating manual that Western will use to prevent catastrophic service disruptions through proactive, rather than reactive, mitigation of water shortages.

The Western WSCP provides a process for an annual water supply and demand assessment for the retail system and structured steps designed to respond to actual conditions. This level of detailed planning and preparation provide accountability and predictability and will help Western maintain reliable supplies and reduce the impacts of any supply shortages and/or interruptions.

The WSCP must be updated based on new requirements every five years and will be adopted as a current update for submission to the California Department of Water Resources by July 1, 2021.

13.1 Water Shortage Contingency Plan Outline

Western's WSCP is organized into six sections:

Section 1 - Overview of the WCSP

Section 2 - Western Wholesale Water Shortage Contingency Plan

Section 3 - Western Retail Water Shortage Contingency Plan

Section 4 - Emergency Response, Seismic Risk Assessment and Mitigation

Section 5 - WSCP Refinement Procedures

Section 6 - Plan Adoption, Submittal and Availability

All sections are applicable to Western Retail except Section 2, which is applicable to Western Wholesale only.

13.2 Overview of the Retail Requirements of the WSCP

The Water Code establishes several prescriptive elements which must be included in a retail water supplier's WSCP. Each element and its location within the WSCP is described below.

Water Supply Reliability Analysis: Summarizes Western Retail's water supply reliability and identifies any key issues that may trigger a shortage condition. This requirement is addressed in Section 3 of the WSCP.

Annual Water Supply and Demand Assessment Procedures: Describes the key data inputs, evaluation criteria, and methodology for assessing the Western Retail system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions. This requirement is addressed in Section 3 of the WSCP.

Shortage Stages: Establishes water shortage levels to clearly identify and prepare for shortages. This requirement is addressed in Section 3 of the WSCP.

Shortage Response Actions: Describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand. This requirement is addressed in Section 3 of the WSCP.

Communication Protocols: Describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements. This requirement is addressed in Section 3 of the WSCP.

Compliance and Enforcement: Defines compliance and enforcement actions available to administer demand reductions. This requirement is addressed in Section 3 of the WSCP.

Legal Authority: Lists the legal documents that grant Western the authority to declare a water shortage and implement and enforce response actions. This requirement is addressed in Section 3 of the WSCP.

Financial Consequences of WSCP Implementation: Describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens. This requirement is addressed in Section 3 of the WSCP.

Monitoring and Reporting: Summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation. Results are used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced. This requirement is addressed in Section 3 of the WSCP.

WSCP Refinement Procedures: Describes the factors that may trigger updates to the WSCP and outlines how to complete an update. This requirement is addressed in Section 5 of the WSCP.

Plan Adoption, Submittal, and Availability: Describes the process for the WSCP adoption, submittal, and availability after each revision. This requirement is addressed in Section 6 of the WSCP.

Part 4

Supporting Information

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Appendix K

AWWA Water Audits

Water Audits for fiscal years 2016, 2017, 2018, 2019, and 2020 were prepared by the City using AWWA Free Water Audit Software v5.0. This audit includes a worksheet, water balance, performance indicators, and dashboard.

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Corona Department of Water and Power
Reporting Year: 15/16 — 7/2015 - 6/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

Master Meter and Supply Error Adjustments

	Grade	Value	Unit	Grade	Pcnt:	Value:	Unit
Volume from own sources:	7	5,628.983	MG/Yr	9			MG/Yr
Water imported:	8	4,040.420	MG/Yr	8			MG/Yr
Water exported:	7	175.362	MG/Yr	7			MG/Yr
WATER SUPPLIED:		**9,494.041**	MG/Yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt:	Value:	Unit
Billed metered:	6	8,471.394	MG/Yr			
Billed unmetered:		0.000	MG/Yr			
Unbilled metered:		0.000	MG/Yr			
Unbilled unmetered:		118.676	MG/Yr	1.25%		MG/Yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION:	**8,590.070**	MG/Yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

WATER LOSSES (Water Supplied - Authorized Consumption)	**903.971**	MG/Yr

Apparent Losses

	Grade	Value	Unit	Pcnt:	Value:	Unit
Unauthorized consumption:		23.735	MG/Yr	0.25%		MG/Yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Unit	Pcnt:	Value:	Unit
Customer metering inaccuracies:	5	0.000	MG/Yr			MG/Yr
Systematic data handling errors:		21.178	MG/Yr	0.25%		MG/Yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	**44.914**	MG/Yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:	**859.058**	MG/Yr
WATER LOSSES:	**903.971**	MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER:	**1,022.647**	MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	9	658.0	miles
Number of active AND inactive service connections:	6	42,125	
Service connection density:		64	conn./mile main
Are customer meters typically located at the curbstop or property line?		Yes	
Average length of customer service line:			(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

	Grade	Value	Unit
Average operating pressure:	10	75.0	psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$47,763,070	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$3.82	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	8	$1,828.00	$/Million gallons

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 73 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Billed metered

3: Customer metering inaccuracies

WAS v5.0

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: City of Corona Department of Water and Power
Reporting Year: 15/16 | 7/2015 - 6/2016

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 73 out of 100 ***

System Attributes:

Apparent Losses:	44.914	MG/Yr
+ Real Losses:	859.058	MG/Yr
= **Water Losses:**	**903.971**	MG/Yr
? Unavoidable Annual Real Losses (UARL):	270.42	MG/Yr
Annual cost of Apparent Losses:	$229,356	
Annual cost of Real Losses:	$1,570,358	Valued at **Variable Production Cost** Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	10.8%	
	Non-revenue water as percent by cost of operating system:	4.2%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	2.92	gallons/connection/day
	Real Losses per service connection per day:	55.87	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.74	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	859.06	million gallons/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	3.18	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	City of Corona Department of Water and Power	
Reporting Year:	15/16	7/2015 - 6/2016
Data Validity Score:	73	

Own Sources / Water Imported	System Input	Water Supplied	Authorized Consumption / Water Losses	Component	Sub-component	Revenue / NRW
		Water Exported 175.362			Billed Water Exported	Revenue Water 175.362
Own Sources (Adjusted for known errors) 5,628.983	System Input 9,669.403	Water Supplied 9,494.041	Authorized Consumption 8,590.070	Billed Authorized Consumption 8,471.394	Billed Metered Consumption (water exported is removed) 8,471.394	Revenue Water 8,471.394
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 118.676	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 1,022.647
					Unbilled Unmetered Consumption 118.676	
			Water Losses 903.971	Apparent Losses 44.914	Unauthorized Consumption 23.735	
					Customer Metering Inaccuracies 0.000	
					Systematic Data Handling Errors 21.178	
Water Imported 4,040.420				Real Losses 859.058	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

AWWA Free Water Audit Software:
Dashboard

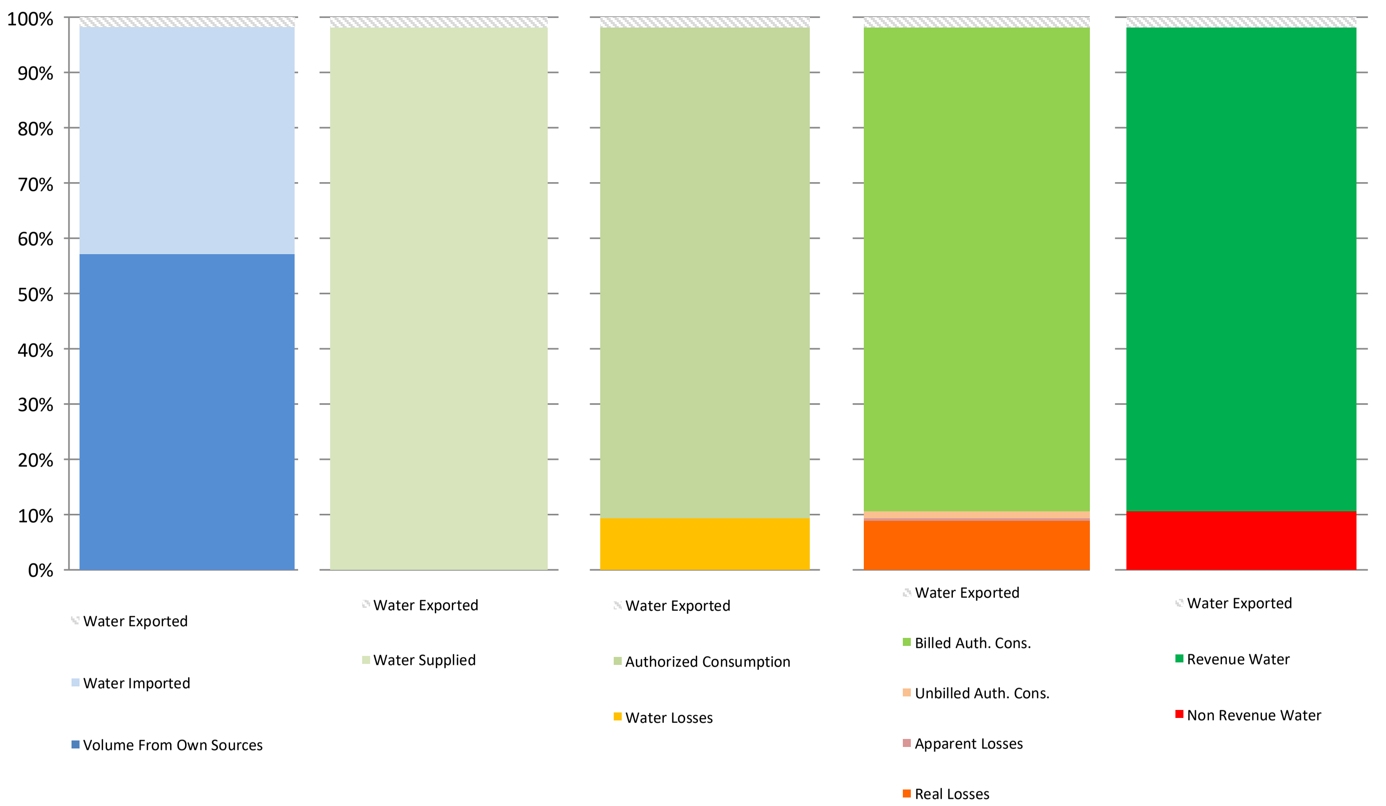
WAS v5.0

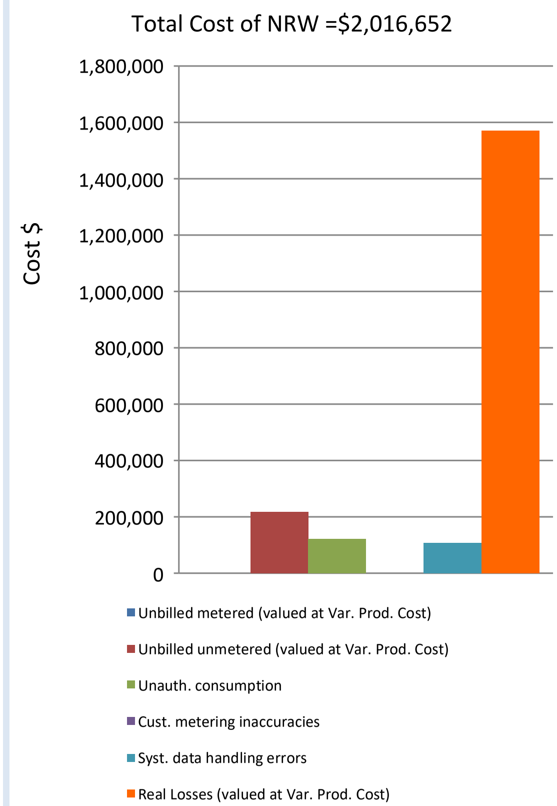
The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	City of Corona Department of Water and Power	
Reporting Year:	15/16	7/2015 - 6/2016
Data Validity Score:	73	

○ Show me the VOLUME of Non-Revenue Water

⦿ Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Corona (3310037)
Reporting Year: 16/17 7/2016 - 6/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

	Grade	Value	Unit	Grade	Pcnt	Value	Unit
Volume from own sources:	7	26,718.429	acre-ft/yr	8		9.207	acre-ft/yr
Water imported:	7	2,525.068	acre-ft/yr	9			acre-ft/yr
Water exported:	5	378.049	acre-ft/yr	9			acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 28,856.241 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Unit	Pcnt	Value	Unit
Billed metered:	5	26,949.270	acre-ft/yr			
Billed unmetered:	n/a		acre-ft/yr			
Unbilled metered:	7	1.214	acre-ft/yr			
Unbilled unmetered:	5	72.141	acre-ft/yr		72.141	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 27,022.625 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

1,833.617 acre-ft/yr

Apparent Losses

	Grade	Value	Unit	Pcnt	Value	Unit
Unauthorized consumption:		72.141	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Unit	Pcnt	Value	Unit
Customer metering inaccuracies:	3	550.010	acre-ft/yr	2.00%		acre-ft/yr
Systematic data handling errors:		67.373	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 689.524 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 1,144.093 acre-ft/yr

WATER LOSSES: 1,833.617 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,906.971 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Unit
Length of mains:	9	802.6	miles
Number of active AND inactive service connections:	7	43,510	
Service connection density:		54	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 5 — 93.6 psi

COST DATA

	Grade	Value	Unit
Total annual cost of operating water system:	10	$44,191,347	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$3.87	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$610.65	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 65 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Billed metered

WAS v5.0

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: City of Corona (3310037)
Reporting Year: 16/17 | 7/2016 - 6/2017

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 65 out of 100 *****

System Attributes:

Apparent Losses:	689.524	acre-ft/yr
+ Real Losses:	1,144.093	acre-ft/yr
= **Water Losses:**	**1,833.617**	acre-ft/yr
? Unavoidable Annual Real Losses (UARL):	1,139.50	acre-ft/yr
Annual cost of Apparent Losses:	$1,162,818	
Annual cost of Real Losses:	$698,640	Valued at **Variable Production Cost** Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	6.6%	
	Non-revenue water as percent by cost of operating system:	4.3%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	14.15	gallons/connection/day
	Real Losses per service connection per day:	23.47	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.25	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	1,144.09	acre-feet/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	1.00	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	16/17	7/2016 - 6/2017
Data Validity Score:	65	

		Water Exported 378.049			Billed Water Exported	Revenue Water 378.049
Own Sources (Adjusted for known errors) 26,709.222	System Input 29,234.290	Water Supplied 28,856.241	Authorized Consumption 27,022.625	Billed Authorized Consumption 26,949.270	Billed Metered Consumption (water exported is removed) 26,949.270	Revenue Water 26,949.270
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 73.355	Unbilled Metered Consumption 1.214	Non-Revenue Water (NRW) 1,906.971
					Unbilled Unmetered Consumption 72.141	
			Water Losses 1,833.617	Apparent Losses 689.524	Unauthorized Consumption 72.141	
					Customer Metering Inaccuracies 550.010	
					Systematic Data Handling Errors 67.373	
Water Imported 2,525.068				Real Losses 1,144.093	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

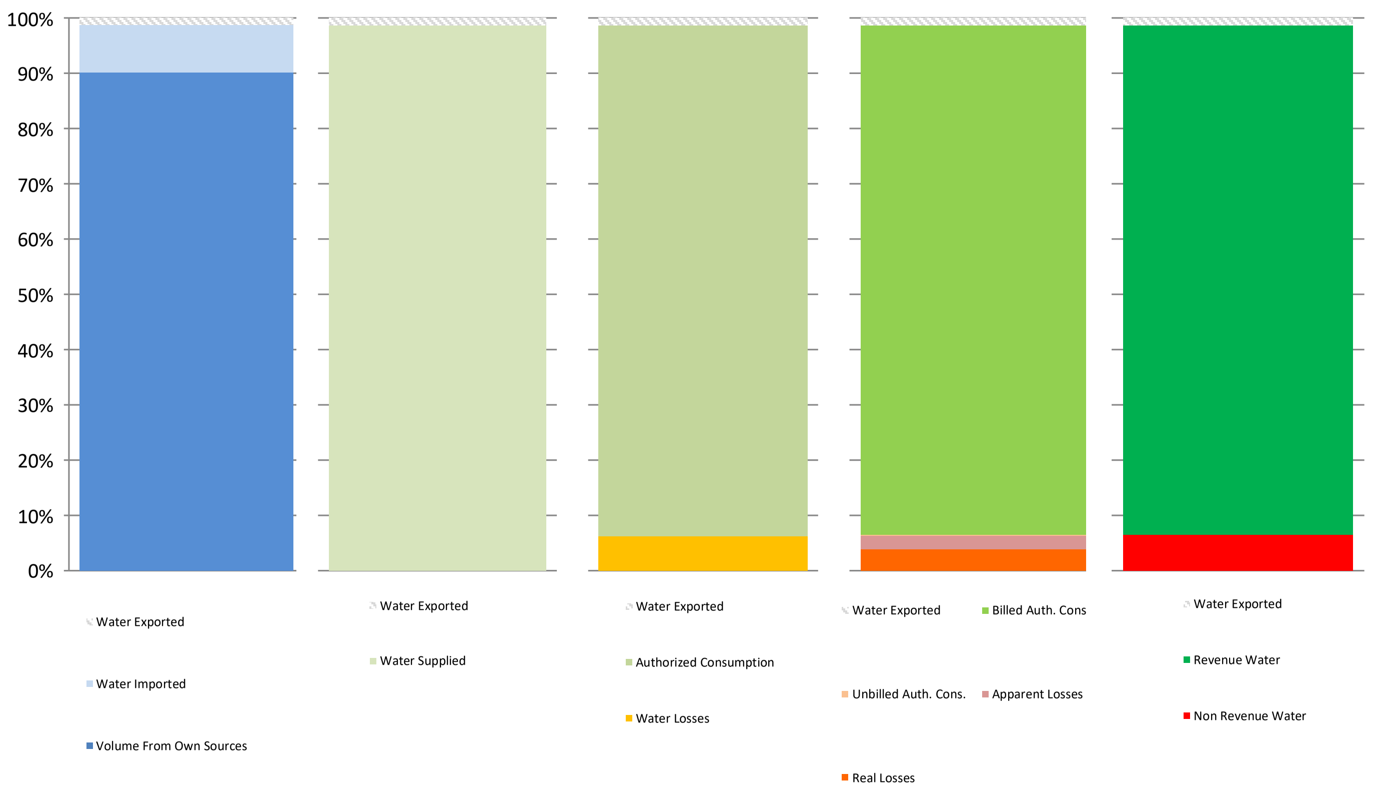
AWWA Free Water Audit Software: Dashboard

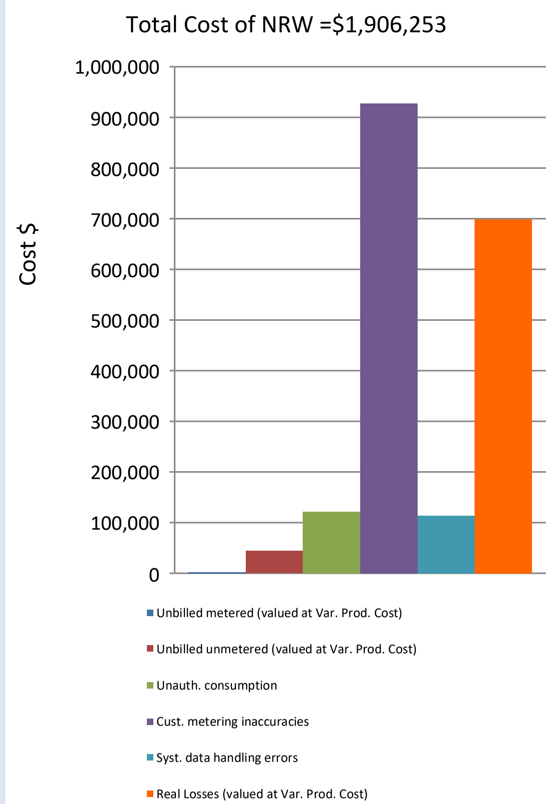
WAS v5.0

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	16/17	7/2016 - 6/2017
Data Validity Score:	65	

○ Show me the VOLUME of Non-Revenue Water
⦿ Show me the COST of Non-Revenue Water





? Click to access definition
\+ Click to add a comment

Water Audit Report for: City of Corona (3310037)
Reporting Year: 17/18 7/2017 - 6/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<----------- Enter grading in column 'E' and 'J' ---------->

	Grade	Value	Units	Grade	Pcnt:	Value:	Units
Volume from own sources:	7	28,599.293	acre-ft/yr	7			acre-ft/yr
Water imported:	7	3,288.765	acre-ft/yr	7			acre-ft/yr
Water exported:	7	389.066	acre-ft/yr	8			acre-ft/yr
WATER SUPPLIED:		**31,498.992**	acre-ft/yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

	Grade	Value	Units	Pcnt:	Value:	Units
Billed metered:	7	29,760.000	acre-ft/yr			
Billed unmetered:	n/a		acre-ft/yr			
Unbilled metered:	8	63.520	acre-ft/yr			
Unbilled unmetered:		393.737	acre-ft/yr	1.25%		acre-ft/yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION:	?	**30,217.257**	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,281.735 acre-ft/yr

Apparent Losses

	Grade	Value	Units	Pcnt:	Value:	Units
Unauthorized consumption:		78.747	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Units	Pcnt:	Value:	Units
Customer metering inaccuracies:	5	608.643	acre-ft/yr	2.00%		acre-ft/yr
Systematic data handling errors:		74.400	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses:	?	**761.791**	acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

☐ Use Customer Retail Unit Cost to

Real Losses = Water Losses - Apparent Losses:	?	**519.944**	acre-ft/yr
WATER LOSSES:		**1,281.735**	acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:	?	**1,738.992**	acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Units
Length of mains:	7	802.6	miles
Number of active AND inactive service connections:	7	43,914	
Service connection density:		55	conn./mile main

Are customer meters typically located at the curbstop or property line?	Yes	
Average length of customer service line:		(length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

	Grade	Value	Units
Average operating pressure:	7	93.6	psi

COST DATA

	Grade	Value	Units
Total annual cost of operating water system:	10	$44,493,822	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$2.55	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$627.75	$/acre-ft

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 70 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: City of Corona (3310037)
Reporting Year: 17/18 | 7/2017 - 6/2018

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 70 out of 100 *****

System Attributes:

Apparent Losses:	761.791	acre-ft/yr
+ Real Losses:	519.944	acre-ft/yr
= **Water Losses:**	**1,281.735**	acre-ft/yr
? Unavoidable Annual Real Losses (UARL):	1,145.85	acre-ft/yr
Annual cost of Apparent Losses:	$846,182	
Annual cost of Real Losses:	$326,395	Valued at **Variable Production Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	5.5%	
	Non-revenue water as percent by cost of operating system:	3.3%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	15.49	gallons/connection/day
	Real Losses per service connection per day:	10.57	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.11	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	519.94	acre-feet/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.45	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	17/18	7/2017 - 6/2018
Data Validity Score:	70	

		Water Exported 389.066			Billed Water Exported	Revenue Water 389.066
Own Sources (Adjusted for known errors) 28,599.293	System Input 31,888.058	Water Supplied 31,498.992	Authorized Consumption 30,217.257	Billed Authorized Consumption 29,760.000	Billed Metered Consumption (water exported is removed) 29,760.000	Revenue Water 29,760.000
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 457.257	Unbilled Metered Consumption 63.520	Non-Revenue Water (NRW) 1,738.992
					Unbilled Unmetered Consumption 393.737	
			Water Losses 1,281.735	Apparent Losses 761.791	Unauthorized Consumption 78.747	
					Customer Metering Inaccuracies 608.643	
					Systematic Data Handling Errors 74.400	
Water Imported 3,288.765				Real Losses 519.944	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

AWWA Free Water Audit Software:
Dashboard

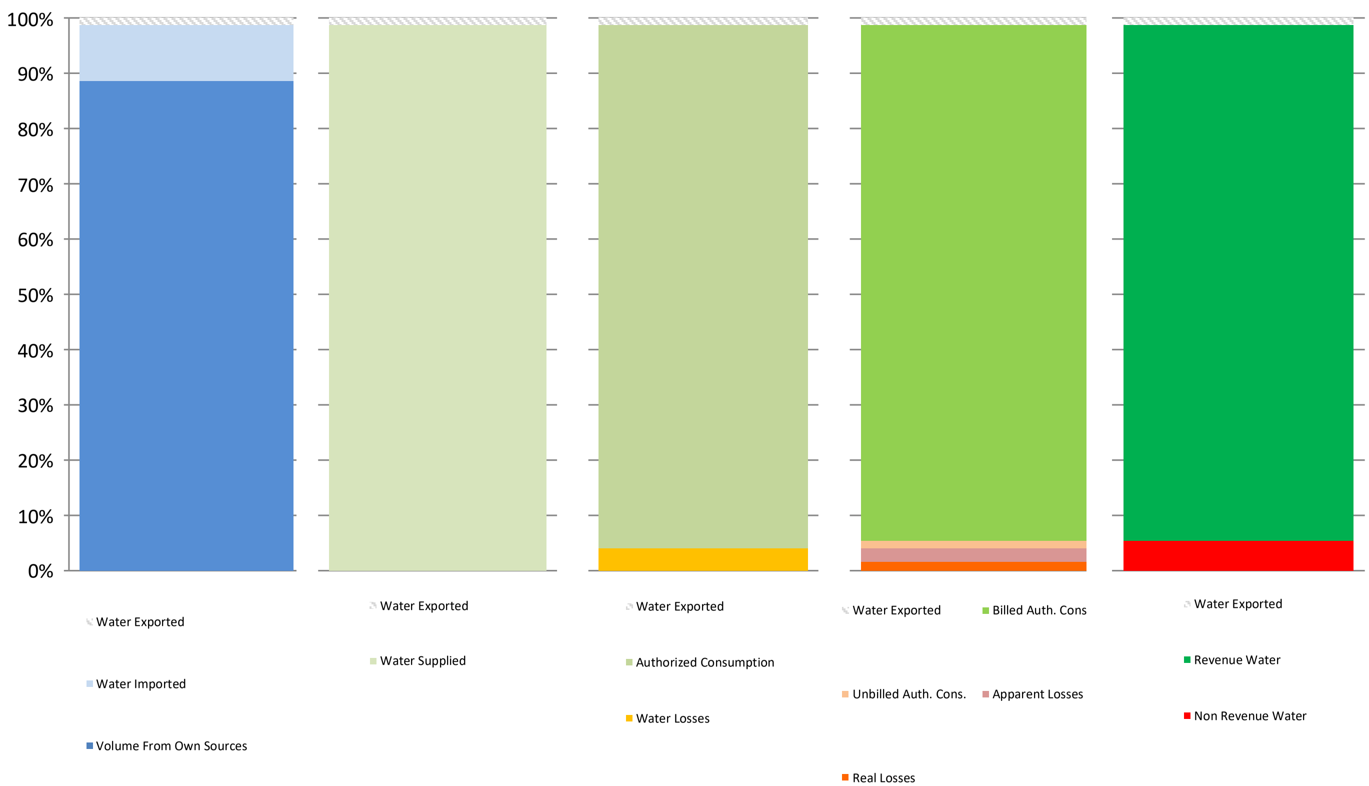
WAS v5.0

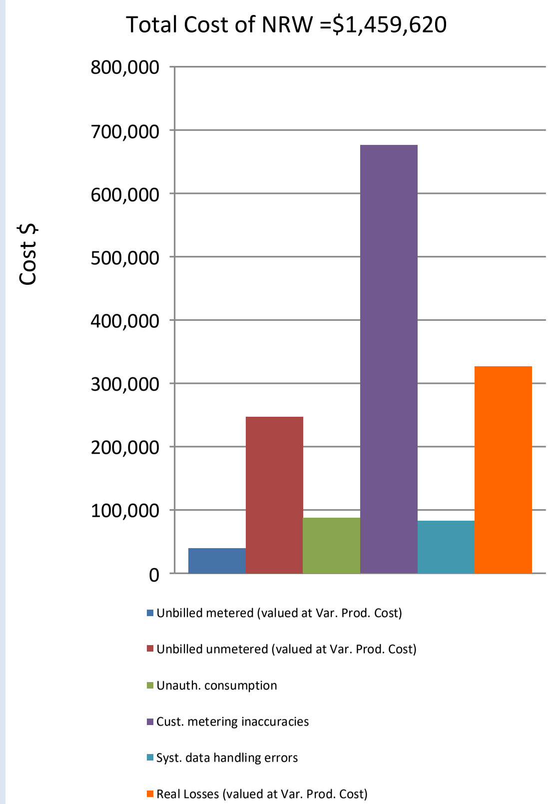
The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	**City of Corona (3310037)**	
Reporting Year:	**17/18**	**7/2017 - 6/2018**
Data Validity Score:	**70**	

○ Show me the VOLUME of Non-Revenue Water

◉ Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Corona (3310037)
Reporting Year: 18/19 | 7/2018 - 6/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

Master Meter and Supply Error Adjustments

Item	Grade	Value	Units	Grade	Pcnt	Value	Units
Volume from own sources:	5	28,068.945	acre-ft/yr	8			acre-ft/yr
Water imported:	7	1,301.253	acre-ft/yr	9			acre-ft/yr
Water exported:	7	381.931	acre-ft/yr	9			acre-ft/yr
WATER SUPPLIED:		**28,988.267**	acre-ft/yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

Item	Grade	Value	Units	Pcnt	Value	Units
Billed metered:	7	27,146.310	acre-ft/yr			
Billed unmetered:	n/a		acre-ft/yr			
Unbilled metered:	8	60.980	acre-ft/yr			
Unbilled unmetered:		362.353	acre-ft/yr	1.25%		acre-ft/yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: **27,569.643** acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,418.624 acre-ft/yr

Apparent Losses

Item	Grade	Value	Units	Pcnt	Value	Units
Unauthorized consumption:		72.471	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Item	Grade	Value	Units	Pcnt	Value	Units
Customer metering inaccuracies:	5	555.251	acre-ft/yr	2.00%		acre-ft/yr
Systematic data handling errors:		67.866	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: **695.587** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **723.036** acre-ft/yr

WATER LOSSES: **1,418.624** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,841.957** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Item	Grade	Value	Units
Length of mains:	7	802.6	miles
Number of active AND inactive service connections:	7	44,612	
Service connection density:		56	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 7 | 93.6 psi

COST DATA

Item	Grade	Value	Units
Total annual cost of operating water system:	10	$42,212,218	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$2.51	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$590.95	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 63 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: City of Corona (3310037)
Reporting Year: 18/19 | 7/2018 - 6/2019

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 63 out of 100 ***

System Attributes:

	Apparent Losses:	695.587	acre-ft/yr
+	Real Losses:	723.036	acre-ft/yr
=	Water Losses:	1,418.624	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	1,157.02	acre-ft/yr
	Annual cost of Apparent Losses:	$760,525	
	Annual cost of Real Losses:	$427,278	Valued at Variable Production Cost Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	6.4%	
	Non-revenue water as percent by cost of operating system:	3.4%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	13.92	gallons/connection/day
	Real Losses per service connection per day:	14.47	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.15	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	723.04	acre-feet/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.62	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	18/19	7/2018 - 6/2019
Data Validity Score:	63	

Own Sources (Adjusted for known errors) 28,068.945	System Input 29,370.198	Water Exported 381.931	Billed Water Exported			Revenue Water 381.931
		Water Supplied 28,988.267	Authorized Consumption 27,569.643	Billed Authorized Consumption 27,146.310	Billed Metered Consumption (water exported is removed) 27,146.310	Revenue Water 27,146.310
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 423.333	Unbilled Metered Consumption 60.980	Non-Revenue Water (NRW) 1,841.957
					Unbilled Unmetered Consumption 362.353	
			Water Losses 1,418.624	Apparent Losses 695.587	Unauthorized Consumption 72.471	
					Customer Metering Inaccuracies 555.251	
					Systematic Data Handling Errors 67.866	
Water Imported 1,301.253				Real Losses 723.036	Leakage on Transmission and/or Distribution Mains *Not broken down*	
					Leakage and Overflows at Utility's Storage Tanks *Not broken down*	
					Leakage on Service Connections *Not broken down*	

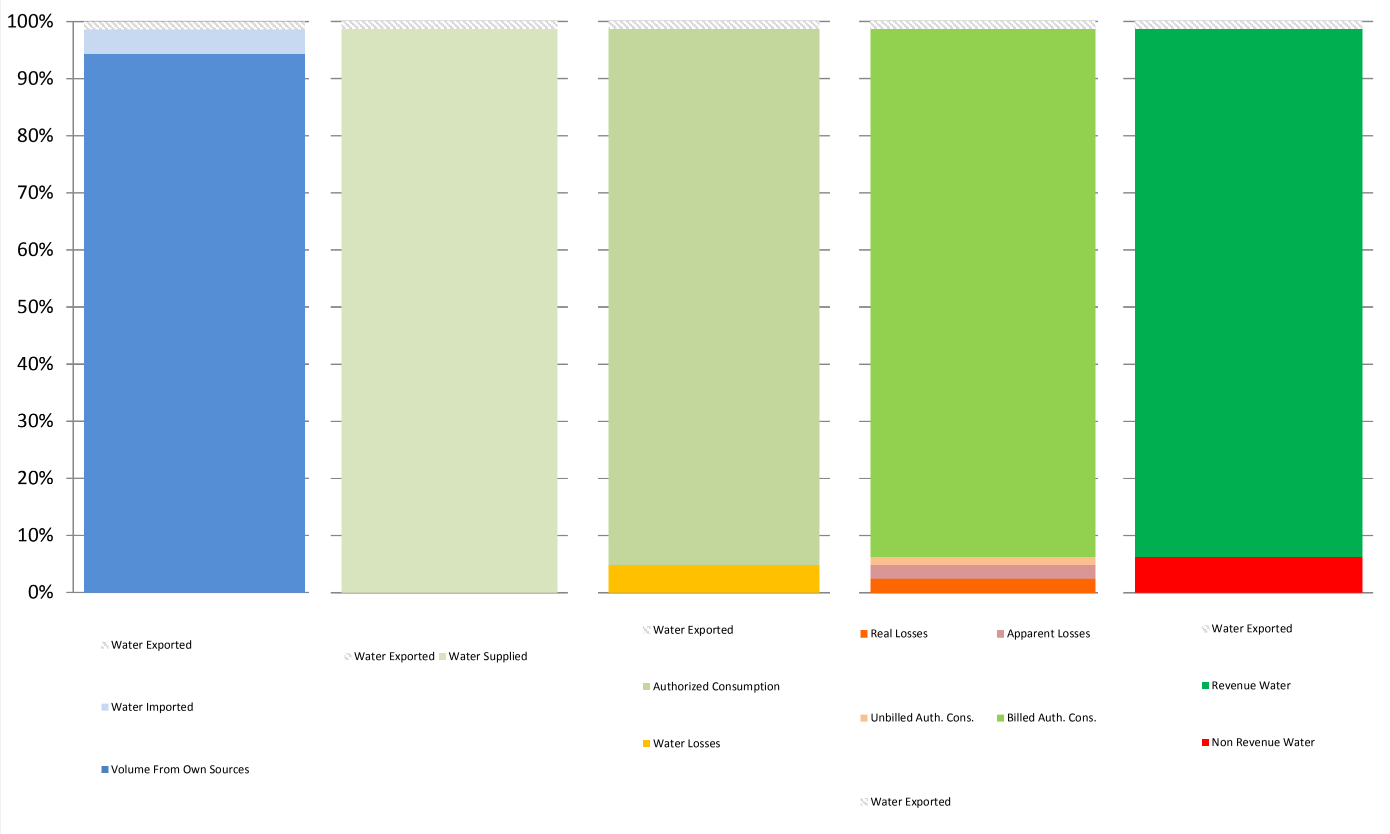
AWWA Free Water Audit Software: Dashboard

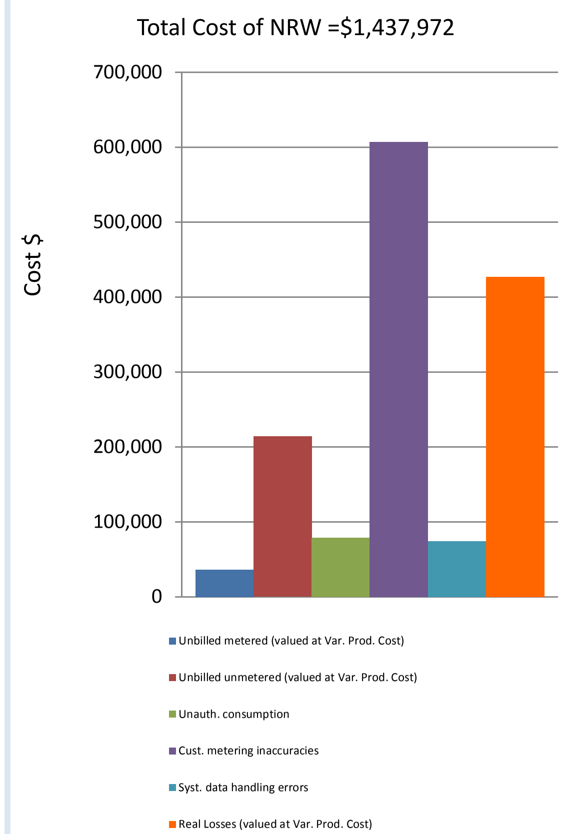
WAS v5.0

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	18/19	7/2018 - 6/2019
Data Validity Score:	63	

Show me the VOLUME of Non-Revenue Water
Show me the COST of Non-Revenue Water





AWWA Free Water Audit Software: Reporting Worksheet

? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Corona (3310037)
Reporting Year: 19/20 7/2019 - 6/2020

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<----------- Enter grading in column 'E' and 'J' ---------->

WATER SUPPLIED

	Grade	Value	Units	Master Meter and Supply Error Adjustments: Grade	Pcnt	Value	Units
Volume from own sources:	7	29,513.352	acre-ft/yr	8			acre-ft/yr
Water imported:	7	1,239.222	acre-ft/yr	9			acre-ft/yr
Water exported:	7	556.864	acre-ft/yr	9			acre-ft/yr
WATER SUPPLIED:		**30,195.710**	acre-ft/yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

	Grade	Value	Units
Billed metered:	7	28,647.940	acre-ft/yr
Billed unmetered:	n/a		acre-ft/yr
Unbilled metered:	8	62.440	acre-ft/yr
Unbilled unmetered:		377.446	acre-ft/yr

Click here: ? for help using option buttons below

Unbilled unmetered — Pcnt: 1.25% Value: acre-ft/yr

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

AUTHORIZED CONSUMPTION: **29,087.826** acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

1,107.884 acre-ft/yr

Apparent Losses

	Grade	Value	Units	Pcnt	Value	Units
Unauthorized consumption:		75.489	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

	Grade	Value	Units	Pcnt	Value	Units
Customer metering inaccuracies:	5	585.926	acre-ft/yr	2.00%		acre-ft/yr
Systematic data handling errors:		71.620	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: **733.035** acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **374.848** acre-ft/yr

WATER LOSSES: **1,107.884** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,547.770** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

	Grade	Value	Units
Length of mains:	8	841.0	miles
Number of active AND inactive service connections:	7	44,884	
Service connection density:		53	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 8 93.6 psi

COST DATA

	Grade	Value	Units
Total annual cost of operating water system:	10	$44,245,485	$/Year
Customer retail unit cost (applied to Apparent Losses):	10	$2.46	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	5	$648.88	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 71 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

WAS v5.0

Water Audit Report for: City of Corona (3310037)
Reporting Year: 19/20 | 7/2019 - 6/2020

***** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 71 out of 100 *****

System Attributes:

	Apparent Losses:	733.035	acre-ft/yr
+	Real Losses:	374.848	acre-ft/yr
=	**Water Losses:**	**1,107.884**	acre-ft/yr
?	Unavoidable Annual Real Losses (UARL):	1,183.09	acre-ft/yr
	Annual cost of Apparent Losses:	$785,503	
	Annual cost of Real Losses:	$243,232	Valued at **Variable Production Cost** Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	5.1%	
	Non-revenue water as percent by cost of operating system:	3.0%	Real Losses valued at Variable Production Cost
Operational Efficiency:	Apparent Losses per service connection per day:	14.58	gallons/connection/day
	Real Losses per service connection per day:	7.46	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	0.08	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	374.85	acre-feet/year
?	Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.32	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	19/20	7/2019 - 6/2020
Data Validity Score:	71	

Own Sources (Adjusted for known errors) 29,513.352	System Input 30,752.574	Water Exported 556.864	Billed Water Exported			Revenue Water 556.864
		Water Supplied 30,195.710	Authorized Consumption 29,087.826	Billed Authorized Consumption 28,647.940	Billed Metered Consumption (water exported is removed) 28,647.940	Revenue Water 28,647.940
					Billed Unmetered Consumption 0.000	
				Unbilled Authorized Consumption 439.886	Unbilled Metered Consumption 62.440	Non-Revenue Water (NRW) 1,547.770
					Unbilled Unmetered Consumption 377.446	
			Water Losses 1,107.884	Apparent Losses 733.035	Unauthorized Consumption 75.489	
					Customer Metering Inaccuracies 585.926	
					Systematic Data Handling Errors 71.620	
Water Imported 1,239.222				Real Losses 374.848	Leakage on Transmission and/or Distribution Mains Not broken down	
					Leakage and Overflows at Utility's Storage Tanks Not broken down	
					Leakage on Service Connections Not broken down	

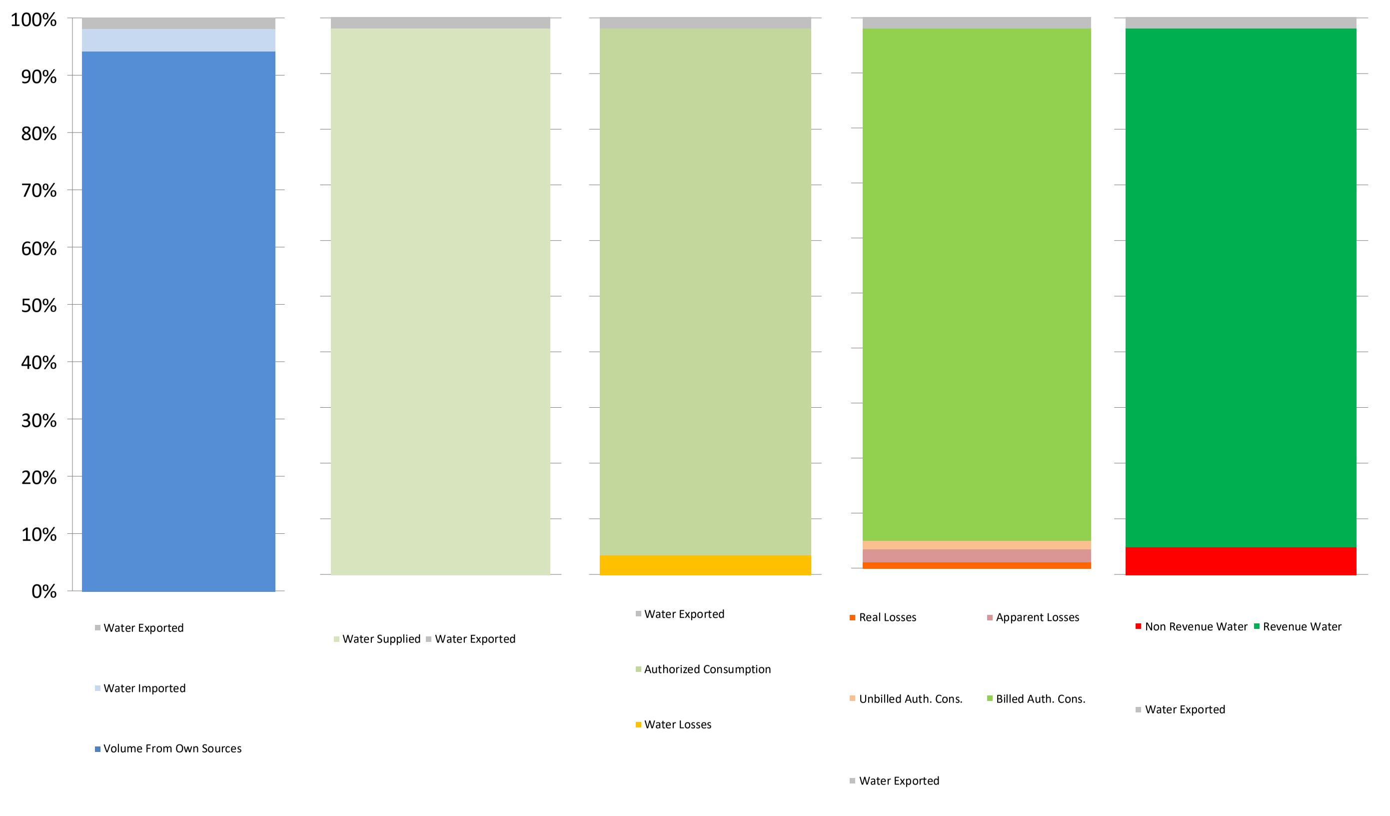
AWWA Free Water Audit Software: Dashboard

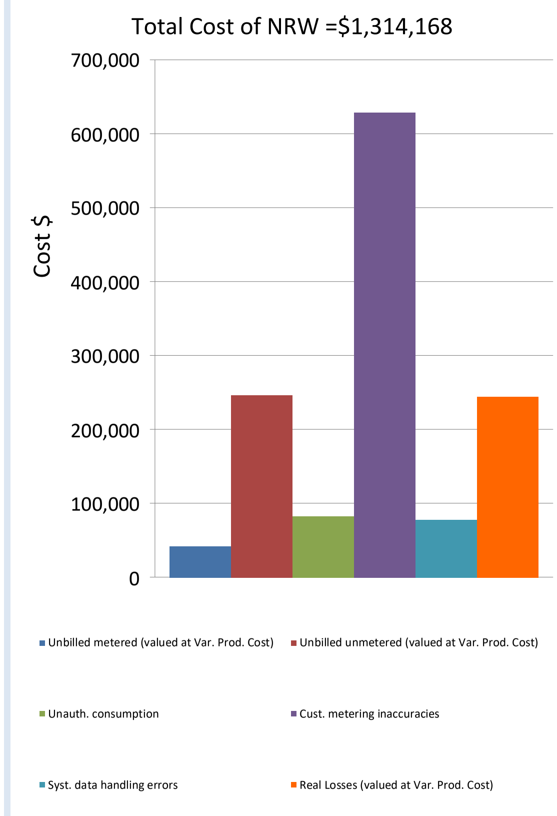
WAS v5.0

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	City of Corona (3310037)	
Reporting Year:	19/20	7/2019 - 6/2020
Data Validity Score:	71	

○ Show me the VOLUME of Non-Revenue Water
⦿ Show me the COST of Non-Revenue Water





Appendix L

Energy Intensity Tables

Urban Water Supplier: *City of Corona*

Water Delivery Product (If delivering more than one type of product use Table O-1C)

Retail Potable Deliveries

Table O-1A: Recommended Energy Reporting - Water Supply Process Approach

Enter Start Date for Reporting Period: 1/1/2020

End Date: 12/31/2020

☐ Is upstream embedded in the values reported?

		Urban Water Supplier Operational Control							
		Water Management Process						Non-Consequential Hydropower (if applicable)	
	Water Volume Units Used	Extract and Divert	Place into Storage	Conveyance	Treatment	Distribution	Total Utility	Hydropower	Net Utility
Volume of Water Entering Process	AF	20,170			16,743	32,789	32789		32789
Energy Consumed (kWh)	N/A	21,236,149			627,687	36,523,981	58387817		58387817
Energy Intensity (kWh/vol. converted to MG)	N/A	3231.1	0.0	0.0	115.1	3418.5	5464.8	0.0	5464.8

Quantity of Self-Generated Renewable Energy

kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

All energy and water volume data are metered. Often, a single energy meter records all energy consumption at a site or facility, making it impossible to distinguish the energy consumed by individual processes when multiple processes are present at one site.

Narrative:

The following sources of potable supply have similar operational control: imported untreated surface water, imported treated surface water, groundwater, and groundwater with high TDS.
Delivery of imported untreated surface water from WMWD undergoes conveyance (source water pumped from wholesaler's transmission pipeline to the City's surface water treatment facilities), treatment (conventional surface water treatment, as well as energy consumed at the facilities for security, lighting, SCADA, and domestic uses at onsite buildings), and distribution (gravity flow to storage facilities where it is pumped as necessary to the various distribution system pressure zones).
Delivery of imported treated surface water from WMWD undergoes conveyance (pressure reduction) and distribution (pumped as necessary to various distribution system pressure zones).
Delivery of low TDS groundwater from the Temescal Basin undergoes extraction (pumped to nearby storage facilities or diverted to blending facilities) and distribution (pumped as necessary to various distribution system pressure zones).
Delivery of groundwater with high TDS from the Temescal Basin undergoes extraction (pumped to Temescal Desalter), treatment (reverse osmosis and blending), and distribution (pumped as necessary to various distribution system pressure zones).

Urban Water Supplier: *City of Corona*

Table O-2: Recommended Energy Reporting - Wastewater & Recycled Water

Enter Start Date for Reporting Period	1/1/2020	**Urban Water Supplier Operational Control**			
End Date	12/31/2020	**Water Management Process**			
☐ Is upstream embedded in the values reported?		Collection / Conveyance	Treatment	Discharge / Distribution	Total
Volume of Water Units Used	AF				
Volume of Wastewater Entering Process (volume units selected above)		*14,716*	*14,716*	*12,627*	*42059*
Wastewater Energy Consumed (kWh)		*537293*	*12614828*	*0*	*13152121*
Wastewater Energy Intensity (kWh/volume converted to MG)		*112.1*	*2630.7*	*0.0*	*959.7*
Volume of Recycled Water Entering Process (volume units selected above)		*4,088*	*0*	*8,539*	*12627*
Recycled Water Energy Consumed (kWh)		*3,514,465*	*0*	*0*	*3514465*
Recycled Water Energy Intensity (kWh/volume converted to MG)		*2638.3*	*0.0*	*0.0*	*854.2*

Quantity of Self-Generated Renewable Energy related to recycled water and wastewater operations

kWh

Data Quality *(Estimate, Metered Data, Combination of Estimates and Metered Data)*

Metered Data

Data Quality Narrative:

All energy and water volume data are metered. Natural gas is used at several facilities.

Narrative:

Energy use for reclaimed water consists of conveyance and distribution. For purposes of this table, these processes have been aggregated. Energy use for wastewater consists of collection, primary/secondary/tertiary treatment, dewatering/drying of biomass, and diversion/disposal of effluent. For purposes of this table, these processes have also been aggregated.

Appendix M

Notification of Public Hearing

Cust Id: 38 Ad Id: 1024 Sch Id: 2784
Your Control #: 2020 Urban Water Management Plan -- Sylvia Edwards, CC

Sentinel Weekly News

1101 California Ave, Suite 100

Corona , CA 92881

951-737-9784

Sylvia Edwards
City of Corona, City Clerk
400 S Vicentia Ave

Corona, CA 92882

Proof of Publication

2015.5 C.C.P.

State of CA, County of Riverside

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the agent of the printer of the Sentinel Weekly News, a newspaper of general circulation, printed and published weekly in the City of Corona, Corona Judicial District, County of Riverside, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Riverside, State of California on April 14, 2000, that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

05/19/21,05/26/21

I certify (or declare) under the penalty of perjury that the following is true and correct. Dated at Corona, CA on

Signature James L Forbes 05/26/2021

CITY OF CORONA
OFFICE OF THE CITY CLERK
NOTICE OF PUBLIC HEARING

PUBLIC NOTICE IS HEREBY GIVEN that the City Council of the City of Corona, California, will conduct a public hearing in the Council Chamber, at City Hall, 400 South Vicentia Avenue, in said City of Corona, on Wednesday, JUNE 16, 2021 AT 6:30 P.M. or thereafter, to consider the following:

PURSUANT TO CALIFORNIA WATER CODE 10642, THE CITY OF CORONA WILL HOLD A PUBLIC HEARING TO SOLICIT COMMENTS ON THE 2020 URBAN WATER MANAGEMENT PLAN (UWMP) DRAFT. THE 2020 UWMP DRAFT IS AVAILABLE FOR PUBLIC REVIEW ON THE CITY'S WEBSITE AT https://www.coronaca.gov/government/departmentsdivisions/departmentofwaterandpower/aboutdwp/planningforourfuture. A HARD COPY WILL ALSO BE AVAILABLE DURING NORMAL BUSINESS HOURS AT CITY HALL LOCATED AT 400 S. VICENTIA AVENUE, CORONA, CA 92882 WITHIN THE CITY CLERK'S OFFICE.

This is a public hearing, and you are invited to attend and comment on the item described above. Due to time constraints and the number of persons wishing to give oral testimony, each speaker will be limited to three minutes. If you challenge any portion of this project in court, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered at, or prior to, the public hearing. If you have written comments that you wish to be included in the staff report, please deliver them to the City Clerk, on or before the Tuesday prior to the meeting. If you have questions about this notice or the application to be heard, please call the City Clerk's Office at (951) 736-2201.

Sylvia Edwards, City Clerk

PUBLISHED: May 19, 2021 and May 26, 2021

Cust Id: 38 Ad Id: 1042 Sch Id: 2842
Your Control #: Annexation No. 25

Sentinel Weekly News
1101 California Ave, Suite 100
Corona , CA 92881
951-737-9784

Sylvia Edwards
City of Corona, City Clerk
400 S Vicentia Ave

Corona, CA 92882

Proof of Publication

2015.5 C.C.P.

State of CA, County of Riverside

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the agent of the printer of the Sentinel Weekly News, a newspaper of general circulation, printed and published weekly in the City of Corona, Corona Judicial District, County of Riverside, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Riverside, State of California on April 14, 2000, that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

05/26/21

I certify (or declare) under the penalty of perjury that the following is true and correct. Dated at Corona, CA on

Signature James I Forbes 05/26/2021

NOTICE OF HEARING ON RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORONA DECLARING INTENTION TO ANNEX TERRITORY TO COMMUNITY FACILITIES DISTRICT NO. 2016-3 (MAINTENANCE SERVICES) OF THE CITY OF CORONA (ANNEXATION NO. 25)

NOTICE IS HEREBY GIVEN that on April 21, 2021, the City Council of the City of Corona adopted Resolution No. 2021-018 declaring the intention of the City Council to annex territory identified as Assessor's Parcel Number 115-290-005 to Community Facilities District No. 2016-3 (Maintenance Services) of the City of Corona, County of Riverside, State of California ("CFD 2016-3"), and fixing the time and place of a public hearing thereon for 6:30 p.m. on June 2, 2021 in the Council Chambers of the City Council, 400 South Vicentia, Corona, California, at which time the City Council will hear the testimony of all interested persons for or against the annexation of said territory to CFD 2016-3 or the levying of special taxes within such territory to pay the costs of providing certain services which are necessary to meet increased demands placed upon the City as a result of the development of said real property. The text of Resolution No. 2021-018, including exhibits thereto, is on file with the City Clerk of the City of Corona located at 400 South Vicentia Avenue, Corona, California and reference is made thereto for the particular provisions thereof. The text of Resolution No. 2021-018 is summarized as follows:

1.
The City Council declared its intention to conduct proceedings for the annexation to CFD 2016-3 of the territory described in Exhibit "A" to Resolution No. 2021-018. The territory proposed to be annexed to CFD 2016-3 is also shown and described on the map thereof entitled "Annexation Map No. 25, Community Facilities District No. 2016-3 (Maintenance Services) of the City of Corona, County of Riverside, State of California," which is on file with the City Clerk.

2.
The types of public services to be provided within CFD 2016-3 are as follows:

(a)
The annual costs of maintaining, servicing, cleaning, repairing and/or replacing landscaped areas (may include reserves for replacement) in public street rightofway, public landscaping, public open spaces and other similar landscaped areas officially dedicated for public use, including, but not limited to, maintenance and lighting of parks, parkways, streets, roads and open space, maintenance and operation of water quality improvements and storm drainage systems, and public street sweeping, within and in the area of CFD 2016-3, as well as the costs associated with the determination of the amount of and the levy and collection of special taxes which are levied to provide such services and costs otherwise incurred in order to carry out the authorized purposes of CFD 2016-3 (the "Special Tax A Services"); and

(b)
The cost of any services permitted under the MelloRoos Community Facilities Act of 1982 including, without limitation, those services authorized to be funded by CFD No. 2016-3 as set forth in the documents adopted by the City Council at the time the CFD was formed to be provided by the City in the event the Administrator makes a determination that a Property Owners' Association fails to adequately provide such services, as well as the costs associated with the determination of the amount of and the levy and collection of special taxes which are levied to provide such services and costs otherwise incurred in order to carry out the authorized purposes of CFD 2016-3 (the "Special Tax B (Contingent) Services").

4. A special tax sufficient to finance the Special Tax A Services and a special tax sufficient to finance the Special Tax B (Contingent) Services (together, the "Special Taxes"), secured by the recordation of a continuing lien against all taxable or nonexempt property in CFD No. 2016-3, shall be annually levied within CFD No. 2016-3. All parcels of taxable property in the territory of CFD No. 2016-3 shall be subject to the annual levy of Special Taxes. The rate and method of apportionment of special taxes to be levied on parcels of taxable property to finance the Special Tax A Services and the Special Tax B (Contingent) Services shall be as set forth in Exhibit "A" to Resolution No. 2021-018. The Special Taxes require the approval of twothirds of the qualified electors of CFD 2016-3 at a special election called for that purpose by the City, with each voter having one vote for each taxable acre, or portion of a taxable acre, owned.

5. The officers of the City who are responsible for providing the Special Tax A Services and the Special Tax B (Contingent) Services are directed to, at or before the time of said hearing, file or cause to be filed a report with the City Council containing a brief description of the services by type and an estimate of the cost of providing those services and the incidental expenses to be incurred in connection therewith. Such report shall be made a part of the record of the public hearing.

6. The voting procedure with respect to the annexation of territory into CFD 2016-3 and the imposition of the Special Taxes shall be by mailed or personally delivered ballot election.

NOTICE IS FURTHER GIVEN that at the time and place of said hearing, all persons interested for or against the annexation of said territory to CFD 2016-3 or the levying of special taxes within such territory to pay the costs of providing certain services within the territory proposed to be annexed to CFD 2016-3 will be heard. At the hearing, protests against the proposals described in Resolution No. 2021-018 may be made by any interested person. Any protests pertaining to the regularity or sufficiency of the proceedings shall be in writing and shall clearly set forth the irregularities or defects to which objection is made. All written protests shall be filed with the City Clerk prior to the time fixed for the hearing. The City Council may waive any irregularities in the form or content of any written protests and at the hearing may correct minor defects in the proceedings. Written protests may be withdrawn in writing at any time before the conclusion of the hearing.

If the owners

Cust Id: 38 Ad Id: 1042 Sch Id: 2842
Your Control #: Annexation No. 25

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05/26/21

I certify (or declare) under the penalty of perjury that the following is true and correct. Dated at Corona, CA on

Signature James I Forbes 05/26/2021

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of onehalf or more of the area of land in the territory included in CFD 2016-3, or if the owners of onehalf or more of the area of land in the territory proposed to be annexed to CFD 2016-3 file written protests against the proposed annexation of such territory to CFD 2016-3, and protests are not withdrawn so as to reduce the protest to less than a majority, no further proceedings shall be undertaken for a period of one year from the date of decision of the City Council on the issues discussed at the hearing.

The hearing may be continued from time to time, but shall be completed within 30 days. At the conclusion of the hearing, the City Council may abandon the proceedings or may, after passing upon all protests, submit the question of levying the special tax within the area proposed to be annexed to CFD 2016-3 to the qualified electors of the area proposed to be annexed.
DATED: April 27, 2021

/s/ Sylvia Edwards
Sylvia Edwards
City Clerk of the City of Corona

Cust Id: 38 Ad Id: 1056 Sch Id: 2887

Your Control #: NEW ORDINANCE(S)
No. 3328 -- Sylvia Edwards, CC

Sentinel Weekly News

1101 California Ave, Suite 100

Corona , CA 92881

951-737-9784

Sylvia Edwards

City of Corona, City Clerk

400 S Vicentia Ave

Corona, CA 92882

Proof of Publication

2015.5 C.C.P.

State of CA, County of Riverside

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the agent of the printer of the Sentinel Weekly News, a newspaper of general circulation, printed and published weekly in the City of Corona, Corona Judicial District, County of Riverside, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Riverside, State of California on April 14, 2000, that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

05/26/21

I certify (or declare) under the penalty of perjury that the following is true and correct. Dated at Corona, CA on

Signature James L Forbes 05/26/2021

NOTICE TO CORONA CITIZENS REGARDING NEW ORDINANCE(S)
No. 3328

On May 19, 2021, the Corona City Council adopted the following Ordinance(s) by the following votes: Ordinance No. 3328 An ordinance of the City of Corona, California to amend Chapter 12.22 (Community Forest Program) of the Corona Municipal Code to change the chapter title, to incorporate an Urban Forest Management Plan, and to amend all sections to incorporate updated landscaping guidelines.

AYES: DADDARIO, CASILLAS, RICHINS, SPEAKE, STEINER
NOES: NONE
ABSTAIN: NONE
ABSENT: NONE

A certified copy of the full text of each ordinance is available in the City Clerk's Office. The City Council meets at 6:30 p.m. in the Council Chambers located at 400 S. Vicentia Avenue, Corona, CA 92882.
Published: May 26, 2021
Sylvia Edwards, City Clerk

Cust Id: 38 Ad Id: 1057 Sch Id: 2888
Your Control #: Ordinance 3329 and 3330 -- Sylvia Edwards, CC

Sentinel Weekly News
1101 California Ave, Suite 100
Corona , CA 92881
951-737-9784
Page 1 of 1

Sylvia Edwards
City of Corona, City Clerk
400 S Vicentia Ave

Corona, CA 92882

Proof of Publication

2015.5 C.C.P.

State of CA, County of Riverside

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years and not a party to or interested in the above-entitled matter. I am the agent of the printer of the Sentinel Weekly News, a newspaper of general circulation, printed and published weekly in the City of Corona, Corona Judicial District, County of Riverside, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Riverside, State of California on April 14, 2000, that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

05/26/21

I certify (or declare) under the penalty of perjury that the following is true and correct. Dated at Corona, CA on

Signature James L Forbes 05/26/2021

NOTICE TO CORONA CITIZENS REGARDING PROPOSED ORDINANCE(S)
No. 3329, 3330, and 3331
On May 19, 2021, the Corona City Council introduced the following Ordinance(s):
Ordinance No. 3329 First reading of an ordinance approving an amendment to the Lincoln Business Center Specific Plan SP81-1 to establish revised sign regulations and augment the approved building materials list for the Lincoln Business Center.
Ordinance No. 3330 First reading of an ordinance amending Corona Municipal Code Section 17.53.020 of Title 17 (Zoning) of the Corona Municipal Code to clarify that certain commercial cannabis uses shall be permitted in Specific Plans that incorporate Chapter 17.44.
Ordinance No. 3331 First reading of an ordinance approving an amendment to the Birtcher Business Center Specific, SP82-2, to permit certain commercial cannabis businesses in the Medium Service Industry District and the Medium Industrial District pursuant to Chapter 17.44 of the Corona Municipal Code (SPA2021-0002).
A certified copy of the full text of each ordinance is available in the City Clerk's Office. The City Council meets the first and third Wednesday of the month at 6:30 p.m. in the Council Chambers located at 400 S. Vicentia Avenue, Corona, CA 92882.
Published: May 26, 2021
Sylvia Edwards, City Clerk

05/26/2021 12:09:38 PM

Appendix N

Resolution of Adoption

The following is a draft Resolution for adoption of the 2020 UWMP. This Appendix will be updated with the final Resolution after adoption.

RESOLUTION NO. 2021-XXXX

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, ADOPTING THE CITY OF CORONA URBAN WATER MANAGEMENT PLAN UPDATE

WHEREAS, the California Legislature enacted Assembly Bill 797 (Water Code Section 10610, et seq., known as the Urban Water Management Planning Act) during the 1983-1984 Regular Session, and as amended subsequently, which mandates that every supplier providing water for municipal purposes to more than 3,000 customers, prepare an Urban Water Management Plan ("UWMP"), the primary objective of which is to plan for the conservation and efficient use of water, ensuring sufficient water supplies and providing a mechanism for a response during drought conditions; and

WHEREAS, the UWMP shall be updated at least once every five years on or before July 1, in years ending in six and one; and

WHEREAS, after public review and hearing, the City Council shall adopt the 2020 UWMP, which shall be filed with the California Department of Water Resources and at the California State Library within thirty days of adoption; and

WHEREAS, the City previously adopted a 2015 UWMP in July 2016, and has provided a sixty-day notice to appropriate agencies in accordance with Section 10642 of the California Water Code providing notice of intent to review and update the Urban Water Management Plan 2020 update; and properly noticed public hearing regarding said 2020 UWMP to be held by the City Council on June 16, 2021.

NOW, THEREFORE, BE IT RESOLVED by the City Council of the City of Corona, California, as follows:

SECTION 1. The City Council hereby adopts the Urban Water Management Plan 2020 update and orders it filed with the City Clerk, the California Department of Water Resources, and the California State Library within 30 days after this date.

SECTION 2. The City Council hereby authorizes and directs the implementation of the water conservation programs and recommendations as set forth in the Urban Water Management Plan 2020 update, which includes water shortage contingency analysis and recommendations regarding necessary procedures, rules, and regulations to carry out effective and equitable water conservation and water reclamation programs.

SECTION 3. In a water shortage, the General Manager, Department of Water and Power, is hereby authorized to declare a Water Shortage Emergency and implement necessary elements of the Urban Water Management Plan 2020 update.

SECTION 4. The City Council shall recommend additional regulations to carry out effective and equitable allocation of water resources.

PASSED AND ADOPTED this 16th day of June 2021.

____

Mayor of the City of Corona, California

ATTEST:

____

City Clerk of the City of Corona, California

CERTIFICATION

I, Sylvia Edwards, City Clerk of the City of Corona, California, do hereby certify that the foregoing Resolution was regularly passed and adopted by the City Council of the City of Corona, California, at an adjourned meeting thereof held on the 16th day of June 2021, by the following vote:

AYES:

NOES:

ABSTAINED:

ABSENT:

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Corona, California, this 16th day of June 2021.

____
City Clerk of the City of Corona, California

(SEAL)

EXHIBIT “A”

2020 URBAN WATER MANAGEMENT PLAN UPDATE

[ON FILE IN THE CITY CLERK’S OFFICE FOR REVIEW]

Appendix O

DWR Checklist

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	§1.2
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	§2.2

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	§2.6
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	§2.6 & Appendix M
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	§1.3.4 & §2.6

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
	~~x~~	~~Section 2.6~~	~~10631(h)~~	~~Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.~~	~~System Supplies~~	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	§3.1 – §3.3
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	§3.4
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	§3.5
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	§3.6
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	§3.5
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	§3.7

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	§4.3.1
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	§4.3.3 & Appendix K
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System Water Use	§4.3.4
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	§4.3.4
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	§4.3.3 & Appendix K
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	§4.4
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	§4.5 & §6.12

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	§5.3 – §5.7
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	§5.7
	~~x~~	~~Section 5.1~~	~~10608.36~~	~~Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.~~	~~Baselines and Targets~~	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	§5.2

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5-year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	§5.3.2
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	§5.7 & Appendix A
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	§7.2 & §7.3
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	§7.2, §7.3, & §6.12

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	§6.2 – §6.9
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	§6.10
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	§6.11
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	§6.4
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	§6.4.2
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	§6.4.1

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	§6.4.2
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	§6.4.3
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	§6.4.4
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	§6.12

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	§6.9
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	§6.7.2
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	§6.7.3
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	§6.7.4.1 & §6.7.4.2
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	§6.7.4.2 & §6.7.4.3

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	§6.7.5
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	§6.7.5
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	§6.8
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier’s service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	§6.7.2
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	§6.10

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	§6.13 & Appendix L
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	§7.2.1
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	§7.2.3.1
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	§7.2.3

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	§7.3
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	§7.3
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	§7.3.2
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	§7.3.3

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	§7.3.2 & §6.12
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	§8.1 – §8.13
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	§8.2
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	§8.11

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	§8.3
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	§8.3
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	§8.4

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	§8.4
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	§8.5.1 – §8.5.5
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	§8.5.1 – §8.5.5
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	§8.5.1 – §8.5.5
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	§8.5.1 – §8.5.5

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	§8.5.8
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	§8.5.7
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	§8.6
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	§8.6
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	§8.7

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	§8.8
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	§8.8
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	§8.8
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	§8.9
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	§8.9

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	§8.9
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	§8.10
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	§8.12
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	§8.13 & §10.5

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	§8.13
	~~x~~	~~Sections 9.1 and 9.3~~	~~10631(e)(2)~~	~~Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.~~	~~Demand Management Measures~~	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	§9.3 & Appendix U
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	§10.4

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	§10.3.1
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	§10.5
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	§10.3 & §10.4
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	§10.4
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	§10.4.2

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	§10.5
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	§10.5
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	§10.5.1
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	§10.6

UWMP Checklist

Retail	Wholesale	Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	UWMP Location
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	§10.6
~~x~~	~~x~~	~~Section 10.6~~	~~10621(c)~~	~~If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.~~	~~Plan Adoption, Submittal, and Implementation~~	N/A
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	§10.7.2

Appendix P

Ordinance 3005

ORDINANCE NO. 3005

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, ESTABLISHING RATES FOR WATER SERVICE FEES

WHEREAS, The City of Corona (the "City") Department of Water and Power ("DWP") purchases wholesale water from Western Municipal Water District ("WMWD") to supplement City water supplies and provide reliable water service to its customers; and

WHEREAS, in 2008, DWP purchased 46% of its customers' domestic water needs from WMWD; and

WHEREAS, effective January 1, 2009, WMWD approved an increase to the rates for its wholesale water (the "January Pass Through") and, on June 17, 2009, approved additional increases to its wholesale water rates and a Delta Surcharge (the "June Pass Through"); and

WHEREAS, beginning on September 4, 2009, the City has determined to raise the rates for its water service fees and pass through to DWP water customers: (1) the January Pass Through; (2) the June Pass Through; (3) any new charges established by WMWD and imposed on DWP; and (4) any other future rate increases to any of WMWD's charges, including wholesale water charges, that are imposed on DWP (collectively referred to herein as the "WMWD Pass Throughs"); and

WHEREAS, the City has further determined to authorize future rate increases due to WMWD Pass Throughs through September 3, 2014; and

WHEREAS, DWP has experienced and anticipates additional inflationary increases in the costs to operate and maintain the City's Water system (the "System") and to provide ongoing repairs, replacements, and upgrades to the System; and

WHEREAS, in order to avoid operational deficits, depletion of reserves, an inability to address infrastructure and water quality improvements, and to continue to provide a safe and reliable water supply, the City has determined to impose annual cost of living increases to the rates for its water service fees beginning on January 1, 2010 and each January 1 thereafter through January 1, 2015; and

WHEREAS, the rate structure for the City's monthly water service fees are comprised of two components: (1) a Readiness to Serve Charge, and (2) a Commodity Charge. The rate increases to the water service fees due to the WMWD Pass Throughs would impact the Commodity Charge component of the water service fees and the annual cost of living rate increases would impact both the Readiness to Serve and Commodity Charge components of the water service fees; and

WHEREAS, the City's rates for water service fees are calculated to recover the costs of the City in providing water services and to proportionately allocate those costs among the water customers; and

WHEREAS, the revenues derived from the water service fees will not exceed the funds required to provide water services and shall be used exclusively for the System; and

WHEREAS, the water service fees will not exceed the proportional cost of the services attributable to each parcel upon which they are imposed; and

WHEREAS, the water service fees will not be imposed on a parcel unless the water services are actually used by, or immediately available to, the owner of the parcel; and

WHEREAS, the City, as the lead agency under the California Environmental Quality Act ("CEQA"), in consultation with the City's Legal Counsel, prepared a Preliminary Exemption Assessment for the adoption of this Ordinance in order to evaluate its potential impacts. The City determined that this Ordinance is exempt from CEQA review under Public Resources Code section

21080(b)(8) and State CEQA Guidelines section 15273 because the Water Service Charges are necessary and reasonable to fund the administration, operation, maintenance, and improvements of the System and will not result in the expansion of the System; and

WHEREAS, California Constitution article XIII D, section 6 ("Article XIII D") requires that prior to imposing any increase to the water service fees, the City shall provide written notice (the "Notice") by mail of: (1) the proposed increases to such rates and charges to the record owner of each parcel upon which the rates and charges are proposed for imposition and any tenant directly liable for payment of the rates and charges; (2) the amount of the rates and charges proposed to be imposed on each parcel; (3) the basis upon which the rates and charges were calculated; (4) the reason for the rates and charges; and (5) the date, time, and location of a public hearing (the "Hearing") on the proposed rates and charges; and

WHEREAS, pursuant to Article XIII D such Notice is required to be provided to the affected property owners and any tenant directly liable for the payment of the rates and charges not less than forty-five days prior to the Hearing on the proposed rates and charges; and

WHEREAS, the City did provide such Notice to the affected property owners and tenants of the proposed Water Service Charges in compliance with Article XIII D; and

WHEREAS, the Hearing was held on this day, July 15, 2009; and

WHEREAS, at the Hearing the City Council heard and considered all oral testimony, written materials, and written protests concerning the establishment and imposition of the proposed rate increases for the water service fees, and at the close of the Hearing the City did not receive written protests against the establishment and imposition of the proposed rate increases for the water service fees from a majority of the affected property owners and tenants directly liable for the payment of the water service fees; and

WHEREAS, the City Council of the City now desires to establish and impose the proposed rates for the water service fees.

NOW THEREFORE, THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

SECTION 1. The City Council finds and determines that the foregoing Recitals are true and correct and incorporates the Recitals herein.

SECTION 2. As the decision-making body for the City, the City Council has reviewed and considered the information contained in the Preliminary Exemption Assessment and administrative record. The City Council finds that the Preliminary Exemption Assessment contains a complete and accurate reporting of the environmental impacts associated with the adoption of this Ordinance and reflects the independent judgment of the Board.

SECTION 3. The City Council hereby finds that the administration, operation, maintenance, and improvements of the System, which are to be funded by the water service fees set forth herein, are necessary to maintain service within the City's existing service area. The City Council further finds that the administration, operation, maintenance, and improvements of the System, to be funded by the water service fees set forth herein, will not expand the System. The City Council further finds that such water service fees are necessary and reasonable to fund the administration, operation, maintenance, and improvements of the System. Based on these findings, the City Council hereby determines that this Ordinance is exempt from the requirements of CEQA pursuant to California Public Resources Code section 21080(b)(8) and State CEQA Guidelines section 15273(a).

SECTION 4. The documents and materials that constitute the record of proceedings on which these findings have been based are located at City of Corona, 400 S. Vicentia Avenue, Corona, California 92882. The custodian for these records is the City Clerk of the City.

SECTION 5. Effective September 4, 2009, the City Council hereby authorizes the Commodity Charge Component of the City's water services fees be established and imposed at the rate of two dollars and six cents ($2.06) per hundreds of cubic feet of water.

SECTION 6. The City Council hereby authorizes the imposition of future rate increases to the Commodity Charge component of its water service fees required as a result of WMWD Pass Throughs. Such WMWD Pass Through rate increases may be imposed for a five-year period, beginning on September 4, 2009, through September 3, 2014. Provided, however, any increases to the rates for the Commodity Charge component of the water service fees as a result of WMWD Pass Throughs authorized pursuant to this Ordinance may not exceed 20% per year. Provided, further that in no event shall such rates be increased in any year as a result of the WMWD Pass Throughs by more than the cost of providing water service. Prior to implementing any such future rate increases, the DWP General Manager shall provide written notice of any such rate increases to DWP customers not less than 30 days prior to the effective date of the rate increases. Any such notice may be provided in the regular billing statements of DWP water customers.

SECTION 7. The City Council hereby authorizes the imposition of annual inflationary adjustments to the rates for the Commodity Charge and Readiness to Serve components of its water service fees for a five-year period, beginning on January 1, 2010, and each January 1 thereafter through January 1, 2015, by an amount not to exceed the greater of: (1) the annual percentage increase, if any, in the Consumer Price Index, all Urban Consumers, for the Los Angeles-Orange-Riverside County Area, as determined by the United States Department of Labor Statistics, or its successor ("CPI Increase"); or (2) 15% (the "Max O&M Increase"). The CPI Increase and the Max O&M Increase are referred to in this Ordinance as the "Cost of Living Increase." Provided, however, in no event shall such rates increase as a result of the Cost of Living Increase by more than the cost of providing water service. Prior to implementing any future rate increases as a result of a

Cost of Living Increase, the DWP General Manager shall provide written notice of any such rate increases to DWP customers not less than 30 days prior to the effective date of the rate increases. Any such notice may be provided in the regular billing statements of DWP water customers.

SECTION 8. The City Council hereby authorizes and directs the DWP General Manager to implement and take all actions necessary to effectuate the rates for the water service fees set forth herein and to file a Notice of Exemption with the County Clerk for Riverside County within five (5) working days of the date of the adoption of this Ordinance.

SECTION 9. If any section, subsection, subdivision, sentence, clause, or phrase in this Ordinance or any part thereof is for any reason held to be unconstitutional or invalid, ineffective by any court of competent jurisdiction, such decision shall not affect the validity or effectiveness of the remaining portions of this Ordinance or any part thereof. The City Council hereby declares that it would have adopted each section irrespective of the fact that any one or more subsections, subdivisions, sentences, clauses, or phrases be declared unconstitutional, invalid, or ineffective.

SECTION 10. This Ordinance shall supersede all other previous City council resolutions and ordinances that may conflict with, or be contrary to, this Ordinance.

SECTION 11. In accordance with California Government Code section 36933(a), within fifteen days after its passage the City Clerk shall cause this Ordinance to be published at least once, with the names of those City Council members voting for or against it, in a newspaper of general circulation published and circulated within the City. If there is no such newspaper, the City Clerk shall cause the ordinance to be posted in at least three public places in the City or published in a newspaper of general circulation printed and published in the county and circulated in the City.

SECTION 12. This ordinance shall become effective thirty (30) days from and after its final passage.

PASSED, APPROVED AND ADOPTED this 5th day of August, 2009.

Mayor of the City of Corona, California

ATTEST:

City Clerk of the City of Corona, California

CERTIFICATION

I, VICTORIA J. WASKO, City Clerk of the City of Corona, California, do hereby certify that the foregoing Ordinance was regularly introduced at an adjourned regular meeting of the City Council of the City of Corona, California, duly held on the 15th day of July, 2009, and thereafter at a regular meeting held on the 5th day of August, 2009, it was duly passed and adopted by the following vote of the Council:

AYES:	**MONTANEZ, NOLAN, SCOTT, SPIEGEL**
NOES:	**SKIPWORTH**
ABSENT:	**NONE**
ABSTAINED:	**NONE**

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Corona, California, this 5th day of August, 2009.

City Clerk of the City of Corona, California

[SEAL]

SUMMARY

On August 5, 2009, the Corona City Council will consider adopting an ordinance establishing rates for water service fees. A certified copy of the full text of this proposed ordinance is posted in the City Clerk's Office.

The City Council meets at 7:00 p.m. in the Council Chambers in the Corona City Hall, located at 400 South Vicentia Avenue. The City Clerk's office is located in City Hall near the Council Chambers.

Appendix Q

Water Conservation Ordinance

ORDINANCE NO. 2962

AN ORDINANCE OF THE CITY OF CORONA, CALIFORNIA, PRESCRIBING WATER CONSERVATION RULES AND REGULATIONS, AMENDING CHAPTER 13.26 (WATER CONSERVATION) AND SECTION 1.08.021 OF THE CORONA MUNICIPAL CODE

WHEREAS, California Constitution article X, section 2 and California Water Code section 100 provide that because of conditions prevailing in the state of California (the "State"), it is the declared policy of the State that the general welfare requires that the water resources of the State shall be put to beneficial use to the fullest extent of which they are capable, the waste or unreasonable use of water shall be prevented, and the conservation of such waters is to be exercised with a view to the reasonable and beneficial use thereof in the interest of the people and the public welfare; and

WHEREAS, pursuant to California Water Code section 106, it is the declared policy of the State that the use of water for domestic use is the highest use of water and that the next highest use is for irrigation; and

WHEREAS, pursuant to California Water Code section 375, the City of Corona (the "City") is authorized to adopt and enforce a water conservation program to reduce the quantity of water used by persons within its jurisdiction for the purpose of conserving the water supplies of the City; and

WHEREAS, on June 4, 2008, the Governor of the State proclaimed a condition of statewide drought and strongly encouraged local agencies to take aggressive, immediate action to reduce water consumption locally and regionally for the remainder of 2008 and prepare for potentially worsening conditions in 2009; and

WHEREAS, because of the prevailing conditions in the State, the current statewide drought, and the declared policy of the State, the City hereby finds and determines that it is necessary and appropriate for the City to adopt, implement, and enforce a water conservation program to reduce the quantity of water used by consumers within the City to ensure that there is sufficient water for human consumption, sanitation, and fire protection; and

WHEREAS, pursuant to California Water Code section 350 the City Council is authorized to declare a water shortage emergency to prevail within its jurisdiction when it finds and determines that the City will not be able to or cannot satisfy the ordinary demands and requirements of water consumers without depleting the water supply of the City to the extent that there would be insufficient water for human consumption, sanitation, and fire protection, and as more fully set forth in this chapter; and

WHEREAS, in the event the City determines that it is necessary to declare that a water shortage emergency exists, the City will be authorized pursuant to this chapter to implement certain drought response measures and a water conservation and regulatory program to regulate water consumption activities within the City and ensure that the water delivered in the City is put to beneficial use for the greatest public benefit, with particular regard to domestic use, including human consumption, sanitation, and fire protection, and that the waste or unreasonable use of water is prevented; and

WHEREAS, the City is authorized to prescribe and define by ordinance restrictions, prohibitions, and exclusions for the use of water during a threatened or existing water shortage and adopt and enforce a water conservation and regulatory program to: (i) prohibit the wastage of City water or the use of City water during such period; (ii) prohibit use of water during such periods for specific uses which the City may from time to time find nonessential; and (iii) reduce and restrict the quantity of water used by those persons within the City for the purpose of conserving the water supplies of the City; and

WHEREAS, the City hereby finds and determines that pursuant to the provisions of title 13, chapter 13.26 of the City of Corona Municipal Code, as hereby amended, the City shall: (i) implement water conservation and drought response measures; (i) regulate the water consumption activities of persons within the City for the purposes of conserving and protecting the City's water supplies, reducing the quantity of water consumed, and deterring and preventing the waste or unreasonable use or unreasonable method of use of valuable water resources; and (ii) establish and collect regulatory fees and impose fines and penalties as set forth herein to accomplish these purposes and recover the costs of the City's water conservation and regulatory program; and

WHEREAS, the City Council hereby finds and determines that it is desirable to codify the rules and regulations governing its actions, and the actions of persons using and consuming water within the City, particularly during declared water shortages and water shortage emergencies, to protect the general welfare and the City's water supplies, and to reduce water consumption in accordance with the declared policies and laws of the State.

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF CORONA, CALIFORNIA, DOES ORDAIN AS FOLLOWS:

Section 1. The City hereby finds and determines that the above recitals are true and correct and incorporated herein.

Section 2. Chapter 13.26 of the Corona Municipal Code is hereby amended in its entirety to read as follows:

Section 13.26.010 Findings and intent.

(A) The City Council finds and determines that because of the prevailing conditions in the State, and the declared policy of the State, it is necessary and appropriate for the city to adopt, implement, and enforce a water conservation program to reduce the quantity of water used by persons within the city to ensure that there is sufficient water for human consumption, sanitation, and fire protection. The City Council further finds and determines that during periods of drought, water shortages, and water shortage emergencies the general welfare requires that the city maximize the beneficial use of its available water resources to the extent that it is capable, and that the waste or unreasonable use, or unreasonable method of use of water shall be prevented and the conservation of water is to be extended with the view to the reasonable and beneficial use thereof in the interests of the people of the city and for the public health, safety, and welfare.

(B) This chapter establishes water conservation and drought response measures and regulations to be implemented during declared water conservation stages.

(C) This chapter establishes five stages of water conservation and drought response measures to be implemented by the city, with increasing restrictions on water use in response to decreasing water supplies and worsening drought conditions.

Section 13.26.020 Purpose and scope.

(A) The purposes of the water conservation provisions of this chapter 13.26 are to:

(1) protect the health, safety, and welfare of the citizens and property owners of the city;

(2) assure the maximum beneficial use of city water supplies; and

(3) attempt to provide sufficient water supplies to meet the basic needs of human consumption, sanitation, and fire protection.

(B) This chapter 13.26 is not intended to repeal, abrogate, annul, impair or in any way interfere with the free use of property by covenant, deed, or other private agreement or with restrictive covenants running with the land to which the city provides water services.

(C) The provisions of this chapter 13.26 shall apply to all persons within the city and all property served by the city wherever situated.

(D) Nothing in this chapter 13.26 is intended to affect or limit the ability of the city to respond to an emergency, including an emergency that affects the ability of the city to supply water.

Section 13.26.030 Definitions. For the purposes of this chapter 13.26, the following words, terms, and phrases shall have the following meanings:

(A) "Appellant" means the person appealing a decision of the approving authority, General Manager, or other designated city official for relief from the requirements of this chapter 13.26.

(B) "Approving authority" means the General Manager or his or her designee, charged with approving or denying written applications for relief.

(C) "Base year consumption amount" means the total amount of water delivered to the property of each customer in the prior fiscal year, as determined by the city.

(D) "Conservation offset" means the implementation of proven conservation techniques which, when installed, will result in a reduction equal to demand of the proposed use.

(E) "Enforcement officer" means any individual employed or otherwise charged by the city to inspect or enforce codes, ordinances, mandates, regulations, resolutions, rules or other laws adopted by the City Council or other regulatory bodies.

(F) "General Manager" means the General Manager of the Department of Water & Power or his or her authorized designee.

(G) "Person" means any natural person, firm, joint venture, joint stock company, partnership, public or private association, club, company, corporation, business trust, organization, public or private agency, government agency or institution, school district, college, university, any other user of water provided by the city, or the manager, lessee, agent, servant, officer or employee of any of them or any other entity which is recognized by law as the subject of rights or duties.

(H) "Potable water" means water which conforms to federal, state, and local standards for human consumption.

(I) "Property owner" or "owner" means the record owner of real property as shown on the most recently issued equalized assessment roll.

(J) "Recycled water" means water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

(K) "Recycled water distribution system" means a piping system intended for the delivery of recycled water exclusively and which is separate from any potable water distribution system.

(L) “Relief” means excuse from compliance with the regulations and restrictions on water use contained in this chapter 13.26.

(M) "Responsible person" shall mean a natural person or legal entity who causes, maintains or allows a violation(s) of the city code to occur or continue by action or failure to act. A responsible person includes, but is not limited to, the owner, tenant, co-tenant, lessee, sub-lessee or other person with any right to possession of the property where a city code violation that is related to the use or condition of property occurs, the on-site manager who normally works daily at the site when the business is open and is responsible for the activities at such premises, and the owner, majority stockholders, corporate officers, trustees and general partners of a legal entity. There may be more than one responsible person for a violation.

(N) “State” means the state of California.

(O) “Water customer” or “customer” means a person who, according to the city’s records, receives water service to a parcel of property.

(P) “Water shortage emergency” means a condition existing within the city in which the ordinary water demands and requirements of persons within the city cannot be satisfied without depleting the water supply of the city to the extent that there would be insufficient water for human consumption, sanitation, and fire protection. A water shortage emergency includes both an immediate emergency, in which the city is unable to meet current water needs of persons within the city, as well as a threatened water shortage, in which the city determines that its supply cannot meet an increased future demand.

(Q) “Watering Window” means a period of time established by the city within a particular water conservation stage regarding allowed water usage for outdoor irrigation.

Section 13.26.040 Water Conservation and unreasonable uses of water.

(A) It is unlawful at any time for any person to make, cause, or use or permit the use of water from the city for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this chapter 13.26, or in an amount in excess of that use permitted by the water conservation stages which are in effect pursuant to this chapter 13.26 or by action taken by the City Council in accordance with this chapter 13.26. The water conservation and drought response measures set forth in this Section 13.26.040 shall be in effect at all times.

(B) It is unlawful at any time for any person to waste water or to use it unreasonably. Unreasonable uses of water shall include, but are not limited to, the following practices:

(1) allowing water to leave a person's property by drainage onto adjacent properties or public or private roadways or streets due to excessive irrigation and/or uncorrected leaks;

(2) failing to repair a water leak; and

(3) using water to wash down sidewalks, driveways, parking areas, tennis courts, patios or other paved areas, except to alleviate immediate safety or sanitation hazards.

(C) A water conservation stage shall be determined in accordance with the provisions of this chapter 13.26. A water conservation stage shall remain in full force and effect until otherwise determined or discontinued by resolution of the City Council declaring that existing water supply conditions and the supply of water available for distribution within the city's service area has been replenished or augmented.

(D) The city may declare a water shortage emergency during any water conservation stage.

(E) During Water Conservation Stage 1, the water conservation and drought response measures of Water Conservation Stage 2 are voluntary and will be enforced through local and regional public education and awareness measures by the city.

(F) During Water Conservation Stages 2 through 5, the water conservation and drought response measures are mandatory and violations are subject to criminal, civil, and administrative penalties and remedies as specified in this chapter 13.26 and State law.

Section 13.26.050 Water Conservation Stage 1. – Normal Water Supply.

Water Conservation Stage 1 is also referred to as a "Normal Water Supply" and applies during periods when the city is able to meet all of the water demands of its customers. Water Conservation Stage 1 is in effect at all times unless the City Council otherwise declares that another water conservation stage is in effect pursuant to this chapter 13.26. Water is a limited natural resource and must be used efficiently and economically to meet the health and safety needs of the community. All normal water efficiency programs and water conservation regulations of the city, including the city's landscape design guidelines for commercial and industrial developments as may be adopted from time to time, will be in full force and effect during Water Conservation Stage 1.

Section 13.26.060 Water Conservation Stage 2. – Minimum Water Shortage.

(A) Water Conservation Stage 2 is also referred to as a "Minimum Water Shortage" and applies during periods when a reasonable probability exists that the city will not be able to meet all of the water demands of its customers. Water Conservation Stage 2 may be caused by, but is not limited to, any or all of the following circumstances or events:

(1) a regional water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use;

(2) groundwater wells are inoperable or unusable (such as by power outages, mechanical failure, or contamination);

(3) alternative water supplies are limited or unavailable; and

(4) groundwater levels or groundwater quality is approaching levels which may require augmentation of the groundwater basin or other actions necessary to protect the groundwater basin as prescribed by the California Department of Water Resources, the Department of Public Health, the State or Regional Water Quality Control Board, Riverside County, or some other regulatory body.

(B) The objective of the measures undertaken in Water Conservation Stage 2 is to reduce water system consumption within the city by ten to fifteen percent as determined and recommended by the General Manager.

(C) Except as otherwise provided in this Section 13.26.060, all water conservation and drought response measures of Water Conservation Stage 1 shall be in full force and effect during Water Conservation Stage 2. Upon declaration of a Water Conservation Stage 2 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

(1) The city shall determine the base year consumption amount. Water customers shall reduce their water consumption by ten to fifteen percent, as determined and recommended by the General Manager, from the base year consumption amount for the duration of Water Conservation Stage 2. Provided, however, the base year consumption amount for any subsequent fiscal year shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 2 for more than twelve months.

(2) Lawns and/or ground covers may be watered and landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated days:

(a) lawns and/or ground cover may be watered and landscaping may be irrigated for properties with odd number street addresses, parks, and the public right-of-ways, only on Saturdays, Mondays, and Wednesdays between the hours of 8:00 p.m. and 10:00 a.m.;

(b) lawns and/or ground cover may be watered and landscaping may be irrigated for properties with even number street addresses only on Sundays, Tuesdays, and Thursdays between the hours of 8:00 p.m. and 10:00 a.m.; and

(c) watering lawns and/or ground cover and irrigating landscaping is prohibited on Fridays and on any day of the week outside of the designated watering windows set forth in Section 13.26.060(C)(2)(a) and (b) hereof.

(3) All irrigation timers shall be adjusted to comply with the provisions of Section 13.26.060(C)(2) hereof.

(4) Notwithstanding the provisions of Section 13.26.060(C)(2), the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.

(5) All open hoses shall be equipped with automatic, positive, shut-off nozzles.

(6) All swimming pools, spas, ponds, and fountains shall be equipped with re-circulating pumps.

(7) All plumbing leaks, improperly adjusted sprinklers, or other water conduits/fixtures that require repair or adjustment shall be corrected to the satisfaction of the city.

(8) No person shall use water to wash down sidewalks, driveways, parking areas, tennis courts, patios, or other paved or hard surface areas, except to alleviate immediate fire or sanitation hazards.

(9) No person shall allow water to leave his or her property by drainage onto adjacent properties or public or private roadways or streets due to excessive irrigation and/or uncorrected leaks.

(10) The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment, is permitted at any time with a hand-held bucket or a hand-held hose equipped with an automatic, positive, shut-off nozzle for quick rinses. Washing may be done at any time on the immediate premises of a commercial car wash or commercial service station, or by a mobile car wash or on-site car wash using high pressure washing equipment.

(11) Use of water from fire hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain the health, safety, and welfare of the public.

(12) All restaurants are prohibited from serving water to their patrons except when specifically requested by the patrons.

(13) Construction operations receiving water from a construction meter or water truck shall not use water unnecessarily for any purpose other than those required by regulatory agencies. Construction projects requiring watering for new landscaping materials shall adhere to the designated irrigation requirements set forth in Section 13.26.060(C)(2) hereof.

Section 13.26.070 Water Conservation Stage 3. - Moderate Water Shortage.

(A) Water Conservation Stage 3 is also referred to as a "Moderate Water Shortage" and applies during periods when the city will not be able to meet all of the water demands of its customers. Water Conservation Stage 3 may be caused by, but is not limited to, any or all of the following circumstances or events:

(1) a regional or statewide water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use;

(2) groundwater wells are inoperable or unusable (such as by power outages, mechanical failure, or contamination);

(3) alternative water supplies are limited or unavailable; and

(4) groundwater levels or groundwater quality is approaching levels which may require augmentation of the groundwater basin or other actions necessary to protect the groundwater basin as prescribed by the California Department of Water Resources, the Department of Public Health, the State or Regional Water Quality Control Board, Riverside County, or some other regulatory body.

(B) The objective of the measures undertaken in Water Conservation Stage 3 is to reduce water system consumption within the city by sixteen to twenty percent as determined and recommended by the General Manager.

(C) Except as otherwise provided in this Section 13.26.070, all water conservation and drought response measures of Water Conservation Stages 1 and 2 shall be in full force and effect during Water Conservation Stage 3. Upon declaration of a Water Conservation Stage 3 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

(1) Water customers shall reduce their water consumption by sixteen to twenty percent, as determined and recommended by the General Manager, from the base year consumption amount for the duration of Water Conservation Stage 3. Provided, however, the base year consumption amount for any subsequent fiscal year shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 3 for more than twelve months.

(2) Lawns and/or ground cover may be watered and landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated days:

(a) lawns and/or ground cover may be watered and landscaping may be irrigated for properties with odd number street addresses, parks, and public right-of-ways, only on Saturdays and Wednesdays between the hours of 8:00 p.m. and 10:00 a.m.;

(b) lawns and/or ground cover may be watered and landscaping may be irrigated for properties with even number street addresses only on Sundays and Thursdays between the hours of 8:00 p.m. and 10:00 a.m.; and

(c) watering lawns and/or ground cover and irrigating landscaping is prohibited on Mondays, Tuesdays and Fridays and on any day of the week outside of the designated water windows set forth in Section 12.26.070(C)(2)(a) and (b) hereof.

(3) Notwithstanding the provisions of Section 13.26.070(C)(2) hereof, the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.

(4) Irrigation timers shall be adjusted to comply with the provisions of Section 13.26.070(C)(2) hereof.

(5) The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is permitted only during the hours of 9:00 a.m. to 6:00 p.m. on Saturdays, Sundays, and Mondays with a hand-held bucket or a hand-held hose equipped with an automatic, positive, shut-off nozzle for quick rinses. Washing is permitted at any time on the immediate premises of a commercial car wash. The use of water by all types of commercial car washes not using partially reclaimed or recycled water shall be reduced in volume by an amount determined by the City Council. Further, such washings are exempt from these regulations where the health, safety, and welfare of the public is contingent upon frequent vehicle cleanings, such as garbage trucks and vehicles used to transport food and perishables.

(6) The overfilling of swimming pools and spas is prohibited. The filling or refilling of ponds, streams, and artificial lakes is prohibited.

(7) The operation of any ornamental fountain or similar structure is prohibited except for short periods of time to prevent damage.

(8) The number of new construction meters shall not exceed the number of currently authorized meters removed from service. A new meter shall be issued only when an old meter is returned. Construction projects requiring water from a construction meter or a water truck shall not use water unnecessarily for any purposes other than those required by

regulatory agencies. Construction projects requiring water for new landscapes shall adhere to the designated days and watering windows as set forth in Section 13.26.070(C)(2) hereof. Further, construction projects necessary to maintain the health, safety, and welfare of the public, as determined by the city, are exempt from these regulations.

Section 13.26.080 Water Conservation Stage 4. – Severe Water Shortage.

(A) Water Conservation Stage 4 is also referred to as a "Severe Water Shortage" and applies during periods when the city will not be able to meet all of the water demands of its customers. Water Conservation Stage 4 may be caused by, but is not limited to, any or all of the following circumstances or events:

(1) a regional or statewide water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring persons to reduce water use;

(2) groundwater wells are inoperable or unusable (such as by power outages, mechanical failure, or contamination);

(3) alternative water supplies are limited or unavailable;

(4) groundwater levels or groundwater quality is approaching levels which may require augmentation of the groundwater basin or other actions necessary to protect the groundwater basin as prescribed by the California Department of Water Resources, California Department of Public Health, the Regional Water Quality Control Board, Riverside County, or some other regulatory body; and

(5) a major failure of any supply or distribution facility, whether temporary or permanent, occurs in the water distribution system of the State, the Metropolitan Water District of Southern California, the Western Municipal Water District, or city water facilities.

(B) The objective of the measures undertaken in Water Conservation Stage 4 is to reduce water consumption within the city by twenty-one to forty percent as determined and recommended by the General Manager.

(C) Except as otherwise provided in this Section 13.26.080, all water conservation and drought response measures of Water Conservation Stages 1, 2, and 3 shall be in full force and effect during Water Conservation Stage 4. Upon declaration of a Water Conservation Stage 4 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

(1) Water customers shall reduce their water consumption by twenty to forty percent from the base year consumption amount for the duration of the Water Conservation Stage 4. Provided, however, the base year consumption amount for subsequent

fiscal years shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 4 for more than twelve months.

(2) Irrigation of landscaping shall be limited to supporting minimal survival of trees and shrubs. Landscaping may be irrigated, including construction meter irrigation, for a maximum of twenty minutes per day only during the following designated watering windows and designated day:

(a) properties with odd number street addresses, parks, and public right of ways may irrigate landscaping only on Saturdays between the hours of 8:00 p.m. and 10:00 a.m.;

(b) properties with even number street addresses may irrigate landscaping and pastures only on Sundays between the hours of 8:00 p.m. and 10:00 a.m.; and

(c) irrigating landscaping is prohibited on Mondays, Tuesdays, Wednesdays, Thursdays, and Fridays and outside the designated watering windows set forth in Section 13.26.080(C)(2)(a) and (b).

(3) Notwithstanding the provisions of Section 13.26.080(C) hereof, the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.

(4) All outdoor watering and irrigation of lawns and ground covers is prohibited with the exception of plant materials classified and determined by the City Manager to be rare, exceptionally valuable, or essential to the well being of the public at large or rare animals, and for which relief has been otherwise granted pursuant to Section 13.26.150.

(5) The washing of automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment is prohibited. Washing is permitted at any time on the immediate premises of a commercial car wash. Commercial car washes shall only use partially reclaimed or recycled water for washing automobiles, trucks, trailers, boats, airplanes and other types of mobile equipment. Further, such washings are exempt from these regulations where the health, safety and welfare of the public is contingent upon frequent vehicle cleanings, such as garbage trucks and vehicles used to transport food and perishables.

(6) The filling, refilling, or adding of water to swimming pools, spas, ponds, streams, and artificial lakes is prohibited.

(7) The operation of any ornamental fountain, pond, or similar structure is prohibited except for short periods of time to prevent damage.

(8) The use of water for cooling mists is prohibited.

(9) The use of water for commercial, manufacturing, or processing purposes shall be reduced in volume by an amount determined by the City Council and/or as recommended by the General Manager.

(10) No new construction meters will be issued. Construction water shall not be used for earth work, road construction purposes, dust control, compaction, or trenching jetting. Construction projects necessary to maintaining the health, safety, and welfare of the public, as determined by the city, are exempt from these regulations.

(11) Provided the City Council has declared a water shortage emergency pursuant to California Water Code sections 350 *et seq*., except as to property for which a building permit has been heretofore issued, no new building permit(s) shall be provided, except in the following circumstances:

(a) for projects necessary to protect the public's health, safety, and welfare, as determined by the city;

(b) when using recycled water;

(c) when the recipient of the building permit can demonstrate that no net increase in water use will occur; or

(d) where the recipient of the building permit provides a conservation offset. A conservation offset may be effected by paying a fee established by the city in an amount necessary to cover the cost of implementing conservation techniques or acquiring alternative water sources. The fee will be based on the conservation offset required for an equivalent dwelling unit. Such fee shall apply to residential as well as commercial and industrial buildings, and may be adjusted from time to time as determined by the city.

Section 13.26.090 Water Conservation Stage 5. – Critical Water Shortage.

(A) Water Conservation Stage 5 is also referred to as a "Critical Water Shortage" and applies during periods when the city will not be able to meet all of the water demands of its customers. Water Conservation Stage 5 may be caused by, but is not limited to, any or all of the following circumstances or events:

(1) a regional or statewide water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use;

(2) groundwater wells are inoperable or unusable (such as by power outages, mechanical failure, or contamination);

(3) alternative water supplies are limited or unavailable;

(4) groundwater levels or groundwater quality is approaching levels which may require augmentation of the groundwater basin or other actions necessary to protect the groundwater basin as prescribed by the California Department of Water Resources, California Department of Public Health, Regional Water Quality Control Board, Riverside County, or some other regulatory body; and

(5) a major failure of any supply or distribution facility, whether temporary or permanent, occurs in the water distribution system of the State, the Metropolitan Water District of Southern California, the Western Municipal Water District, or city water facilities and the city cannot meet all of the water demands of its customers.

(B) The objective of the measures undertaken in Water Conservation Stage 5 is to reduce water consumption by forty percent or more as determined and recommended by the General Manager.

(C) Except as otherwise provided in this Section 13.26.090, all water conservation and drought response measures of Water Conservation Stages 1, 2, 3, and 4 shall be in full force and effect during Water Conservation Stage 5. Upon declaration of a Water Conservation Stage 5 by the City Council, implementation by the city and publication of notice, the following water conservation and drought response measures shall apply:

(1) Water customers shall reduce their water consumption by forty-one percent or more from the base year consumption amount for the duration of Water Conservation Stage 5. Provided, however, the base year consumption amount for subsequent fiscal years shall be determined by the city as appropriate in the event that the city is required to continue the Water Conservation Stage 5 for more than twelve months.

(2) All outdoor watering and irrigation of lawns and ground cover, and landscaping is prohibited, with the exception of the use of recycled water to irrigate fruit trees, lawns and ground covers, and ornamental trees and shrubs, which is permitted on any day and at any time. Recycled water shall not be permitted to run into city streets or the city storm water conveyance system.

(3) Provided the City Council has declared a water shortage emergency pursuant to California Water Code sections 350 *et seq.*, the city shall not allow any new connections to the water system during Water Conservation Stage 5.

Section 13.26.100 Mandatory Conservation Phase Implementation.

(A) The General Manager, or his or her designee, shall monitor the projected supply and demand for water by its customers on a daily basis during periods of a water shortage or drought and shall recommend to the City Council the extent of the conservation required through the implementation and/or termination of particular water conservation stages to prudently plan and supply water to its customers. Thereafter, the City Council may order the implementation or termination of the appropriate water conservation stage.

(B) The declaration of any stage beyond Water Conservation Stage 1 shall be made by the recommendation of the General Manager and resolution of the City Council. Within ten (10) days of the adoption of the resolution declaring the applicable Water Conservation Stage, the city shall make a public announcement of the applicable Water Conservation Stage, which shall be published a minimum of one (1) time for three (3) consecutive days in a daily newspaper of general circulation. Such declaration and notice shall provide the extent, terms, and conditions respecting the use and consumption of water in accordance with the applicable water conservation stage as provided in this chapter 13.26. Upon such declaration and publication of such notice, due and proper notice shall be deemed to have been given each and every person supplied water within the city. The water conservation stage designated shall become effective immediately upon announcement.

(C) The declaration of a water shortage emergency during any water conservation stage shall be made in accordance with California Water Code sections 350 *et seq.*

Section 13.26.110 Violations and remedies.

(A) It shall be unlawful for any person to willfully violate the provisions of this chapter 13.26. A violation of any of these provisions shall be a misdemeanor subject to imprisonment in the county jail for not more than thirty days or by fine not to exceed $1,000, or by both, as provided in California Water Code section 377.

(B) In addition to any remedies or enforcement measures provided by State law or in this chapter 13.26, any violation of this chapter 13.26 is subject to the provisions of chapters 1.08 and 1.09 of the Corona Municipal code.

(C) In addition to any other remedies provided in this Code or available under applicable law, the city can alternatively seek injunctive relief in the Superior Court or take enforcement action, including discontinuing or appropriately limiting water service to any customer, for violations of this chapter 13.26.

Section 13.26.120 Notices and additional enforcement measures.

(A) In addition to or in conjunction with the notice of violation provided pursuant to the provisions of chapter 1.08, for a first violation of any provision of this chapter 13.26, within two weeks of the violation:

(1) the city may send an enforcement officer or provide written notice to the property owner, customer, occupant, or responsible person of the property where the violation occurred to advise such person of:

(a) the water conservation stage then in effect and the provisions of this chapter 13.26 relating thereto;

(b) water conservation and drought response measures that are required and may be implemented pursuant to this chapter 13.26;

(c) possible consequences and actions which may be taken by the city for future violations of this chapter 13.26, including discontinuance of water service;

(d) penalties that may be imposed for the specific violation and any future violations of this chapter 13.26; and

(2) if the General Manager or his or her designee deems it to be appropriate, the city may order the installation of a flow-restricting device on the service line for any person who violates any term or provision of this chapter 13.26.

(B) In addition to or in conjunction with the notice of violation provided pursuant to the provisions of chapter 1.08, for a second or any subsequent violation of this chapter 13.26, within two weeks of the violation:

(1) the city may send an enforcement officer or provide written notice to the property where the violation occurred to notify the property owner, customer, occupant of the property, or responsible person where the violation occurred to advise such person of:

(a) the water conservation stage then in effect and the provisions of this chapter 13.26 relating thereto;

(b) the water conservation and drought response measures that are required and may be implemented by such person; and

(c) possible consequences, which may occur in the event of any future violations of this chapter 13.26;

(2) if the General Manager or his or her designee deems it to be appropriate, the city may order the installation of a flow-restricting device on the service line for any person who violates any term or provision of this chapter 13.26; and

(3) if the General Manager or his or her designee deems it to be appropriate, the city may discontinue water service at the location where the violation occurred.

(C) The city may, after one written notice of violation, order that a special meter reading or readings be made in order to ascertain whether wasteful or unreasonable use of water is occurring.

(D) All moneys collected under this Section 13.26.140 shall be deposited in a special account of the city and shall be made available for enforcement of this chapter 13.26.

(E) The city may, at its option, elect to petition the Superior Court to confirm any order establishing administrative penalties and enter judgment in conformity therewith in accordance with the provisions of Sections 1285 to 1287.6, inclusive, of the California Code of Civil Procedure.

Section 13.26.130 Civil actions.

(A) In addition to any other remedies provided in the Code, any violation of this chapter 13.26 may be enforced by civil action brought by the city.

(B) In any such action, the city may seek, and the court may grant, as appropriate, any or all of the following remedies:

(1) a temporary and/or permanent injunction;

(2) assessment of the violator for the costs of any investigation, which led to the establishment of the violation, and for the reasonable costs of preparing and bringing legal action under this Section 13.26.130;

(3) any other costs incurred in enforcing the provisions of this chapter 13.26; and

(4) any other action the city deems appropriate to protect the general welfare and the City's water supplies, and to reduce water consumption in accordance with this chapter 13.26 and the declared policies and laws of the State.

(c) Assessments under this subsection shall be paid to the city to be used exclusively for costs associated with implementing or enforcing the water conservation and regulatory provisions of this chapter 13.26.

Section 13.26.140 Recovery of costs.

(A) The General Manager or his or her designee shall serve an invoice for costs upon the person or responsible person who is subject to a notice of violation, a cease and desist order, or an administrative compliance order. An invoice for costs shall be immediately due and payable to the City. If any person or responsible person fails to either pay the invoice for costs or appeal successfully the invoice for costs in accordance with this chapter 13.26, then the City may institute collection proceedings. The invoice for costs may include reasonable attorneys' fees.

(B) The city shall impose any other penalties or regulatory fees, as fixed from time to time by resolution of the City Council, for a violation or enforcement of this chapter 13.26.

(C) In addition to the costs which may be recovered pursuant to Section 1.08.022 of the Code, and in order to recover the costs of the water conservation regulatory program set forth in this chapter 13.26, the City Council may, from time to time, fix and impose by resolution fees and charges. The fees and charges may include, but are not limited to, fees and charges for:

(1) any visits of a water conservation specialist, enforcement officer, or other city staff for time incurred for meter reading, follow-up visits, or the installation or removal of a flow-restricting device;

(2) monitoring, inspection, and surveillance procedures pertaining to enforcement of this chapter 13.26;

(3) enforcing compliance with any term or provision of this chapter 13.26;

(4) reinitiating service at a property where service has been discontinued pursuant to this chapter 13.26;

(5) processing any fees necessary to carry out the provisions of this chapter 13.26; and

(6) any other necessary and appropriate fees and charges to recover the cost of providing the city's water conservation regulatory program.

Section 13.26.150 Relief from compliance.

Consideration of written applications for relief from compliance ("relief") regarding the regulations and restrictions on water use set forth in this chapter 13.26 may be made by the city.

(A) Written applications for relief shall be accepted, and may be granted or denied, by the approving authority at his or her sole discretion. The application shall be in a form prescribed by the city and shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the review proceedings related thereto.

(B) The grounds for granting or conditionally granting an application for relief are:

(1) a customer has reduced water usage to the minimum feasible level but cannot reduce usage by the amount required by then-current mandatory water conservation stage declared pursuant to this chapter due to the number of people in the household or medical necessity, where "reduced water usage to the minimum feasible level" shall mean that the customer has installed xeriscaping or other low-water landscaping (or has ceased watering other types of landscaping), high efficiency water-using appliances, water-efficient toilets, water-saving faucet devices, and low-flow shower heads, and is complying in all other respects with the requirements of this chapter; or

(2) due to unique circumstances other than those described in subsection (1) above, a specific requirement of this chapter 13.26 would result in undue hardship to a person using city water or to property upon which city water is used, that is disproportionate to the impacts to other city water users generally or to similar property or classes of water users; or

(3) failure to grant a relief would adversely affect the health, sanitation, fire protection, or safety of the applicant or the public.

(C) The application for a relief shall be accompanied, as appropriate, with photographs, maps, drawings, and other information substantiating the applicant's request, including a statement of the applicant. Provided, however, the city may request such other additional information as it deems appropriate in order to process and/or review the application for relief.

(D) An application for a relief shall be denied unless the approving authority finds, based on the information provided in the application, supporting documentation, or such other additional information as may be requested, and on water use information for the property as shown by the records of the city, all of the following:

(1) That the relief does not constitute a grant of special privilege inconsistent with the limitations upon other city customers.

(2) That because of special circumstances applicable to the property or its use, comprising any of the circumstances set forth in subsection (B) of this section, the strict application of this chapter 13.26 would have a disproportionate impact on (a) the property or use that exceeds customers generally, or (b) the applicant's health that exceeds customers generally.

(3) That the authorization of such relief will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the city to effectuate the purposes of this chapter 13.26 and will not be detrimental to the public interest.

(4) That the condition or situation of (a) the subject property or the intended use of the property for which the relief is sought is not common, recurrent, or general in nature, or (b) the applicant's health or safety is not common, recurrent, or general in nature.

(E) The denial or grant of a relief shall be acted upon within fifteen (15) business days of the submittal of the complete application, including any photographs, maps, drawings, and other information substantiating the applicant's request and the statement of the applicant. The application may be approved, conditionally approved, or denied, subject to subsection (G) of this section. The decision of the approving authority shall be prepared in writing, include terms and conditions, if any, set forth findings in support of the decision, and be promptly sent to the applicant.

(F) The denial of a request for a relief may be appealed in writing to the City Manager. An appeal shall be made in accordance with the following procedures:

(1) The appellant shall complete and submit in writing a form provided by the city for such purpose and shall state in such form the grounds for his or her appeal. The form shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the proceedings. All appeals shall be submitted to the City Clerk within thirty (30) calendar days of the date of the notice of the denial of the request for a relief.

(2) The City Manager, or his or her designee, shall review the appeal and any related information provided, and, if necessary, cause an investigation and report to be made concerning the request for a relief. The City Manager, or his or her designee, shall have fifteen (15) calendar days from the submission of the appeal to render a decision on whether to grant or deny the appeal and mail notice thereof to the appellant. The decision shall be prepared in writing, include terms and conditions, if any, and set forth findings in support of the decision.

(3) The decision of the City Manager, or his or her designee, may be appealed by the appellant to the City Council. Such appeal must be submitted in writing on the appropriate city form and filed with the City Clerk within fifteen (15) calendar days of the date of decision of the City Manager, or his or her designee. The form shall be accompanied by a non-refundable processing fee in an amount as determined by resolution of the City Council for the purpose of defraying the costs incidental to the proceedings. The City Council shall conduct a hearing on such appeal at its next regularly scheduled City Council meeting; provided, however, the City Council shall have received the notice of appeal at least fifteen (15) calendar days prior to such meeting. If the appeal is not submitted within at least fifteen (15) calendar days prior to a regularly scheduled City Council meeting, then the hearing shall be held at the following regularly scheduled City Council meeting. A notice of the hearing shall be mailed to the appellant at least ten (10) calendar days before the date fixed for the hearing. The City Council shall review the appeal de novo. The determination of the City Council shall be conclusive. Notice of the determination by the City Council shall be mailed to the appellant within ten (10) calendar days of such determination, indicate whether the appeal has been granted in whole or in part, set forth the terms and conditions of the relief, if any, granted to the appellant, and set forth findings in support of the decision. If the appeal is denied in its entirety, the appellant shall comply with all terms and conditions of this chapter 13.26 and the applicable water conservation stage then in effect.

(4) Until the conclusion of the appeal process, all provisions and decisions under appeal shall remain in full force and effect until the conclusion of the appeal process.

(G) Any grant of a request for relief shall be conditioned upon the continued existence of the facts and circumstances which formed the grounds for granting relief, as provided in this section. The approving authority may revoke any grant of relief if such facts and circumstances are determined no longer to exist.

Section 13.26.160 Water Conservation Programs.

(A) Subject to available funds, the City Manager, or his or her designee, is authorized to develop, promote, and administer water conservation programs to encourage and assist persons in conserving water. The water conservation programs may include, but are not limited to, the following:

(1) installing, or providing rebate programs for the installation of, water saving devices and irrigation systems in the landscaped areas of residential, commercial, industrial, and public property and public rights-of-way;

(2) replacing landscaping and turf with drought tolerant plant material and water efficient landscaping;

(3) developing educational programs to promote water conservation; and

(4) converting, where financially and technically feasible, potable water distribution systems to recycled water distribution systems for landscaped areas of residential, commercial, industrial, and public property and public rights-of way.

(B) The City Manager shall prepare and implement policies and procedures governing any water conservation program established pursuant to this Section 13.26.160.

(C) The City Manager is authorized to enter into agreements relating to such water conservation programs, provided such agreements are approved as to form by the City Attorney.

(D) The expenditure of funds for any water conservation program shall be subject to the provisions of Chapter 3.08, as applicable, and any other provisions of the Municipal Code restricting the expenditure of city funds.

Section 13.26.170 Conflicting Provisions.

If provisions of this chapter 13.26 are in conflict with each other, other provisions of the Code, any other resolution or ordinance of the city, or any State law or regulation, the more restrictive provisions shall apply.

Section 13.26.180 Severability.

If any provision, section, subsection, sentence, clause or phrase or sections of this chapter 13.26, or the application of same to any person or set of circumstances, is for any reason held to be unconstitutional, void or invalid, the invalidity of the remaining portions of sections of this chapter 13.26 shall not be affected, it being the intent of the City Council in adopting this chapter 13.26 that no portions, provisions, or regulations contained herein shall become inoperative, or fail by reason of the unconstitutionality of any other provision hereof, and all provisions of this chapter 13.26 are declared to be severable for that purpose.

Section 3. Section 1.08.021(C) of the Corona Municipal Code is hereby amended by adding subsection (29) to read:

(29) Chapter 13.26 (Water Conservation)

Section 4. The Mayor shall sign this Ordinance and the City Clerk shall attest thereto, and pursuant to California Water Code section 376, this Ordinance shall be effective immediately upon its adoption. Within ten (10) days after its adoption, the City Clerk shall cause this Ordinance to be published once pursuant to California Government Code section 6061 and California Water Code section 376 in full in a newspaper of general circulation which is printed, published, and circulated in the city.

ADOPTED this 7th day of January, 2009.

Karen Spiegel

Mayor of the City of Corona, California

ATTEST:

Victoria J. Wasko

City Clerk of the City of Corona, California

CERTIFICATION

I, VICTORIA J. WASKO, City Clerk of the City of Corona, California, do hereby certify that the foregoing Ordinance was regularly introduced at an adjourned regular meeting of the City Council of the City of Corona, California, duly held the 17th day of December, 2008, and thereafter at a regular meeting thereof held on the 7th day of January, 2009, it was duly passed and adopted by the following vote of the Council:

AYES:	**MONTANEZ, SCOTT, SKIPWORTH, SPIEGEL**
NOES:	**NONE**
ABSENT:	**NOLAN**
ABSTAINED:	**NONE**

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the City of Corona, California, this 7th day of January, 2009.

Victoria J. Wasko

City Clerk of the City of Corona, California

(SEAL)

SUMMARY

On January 7, 2009, the Corona City Council will consider adopting an Ordinance to establish water conservation rules and regulations, including authorizing the City Council to declare water conservation stages and water emergencies.

The City Council meets at 7:00 p.m. in the Council Chambers in the Corona City Hall, located at 400 South Vicentia Avenue. The City Clerk's office is located in City Hall near the Council Chambers.

Appendix R

Water Shortage Contingency Plan

See Appendix Q and Chapter 8 in Volume 1.

Appendix S

Documentation on Seismic Mitigation

Following are the City's LHMP and excerpts from the Riverside County MJLHMP related to seismic vulnerability, as required by the Water Code. The Riverside County MJLHMP may be reviewed in its entirety upon written request to the City.

2017

LOCAL HAZARD MITIGATION PLAN

CITY OF CORONA

6/16/2017

PLAN ADOPTION/RESOLUTION

The City of Corona will submit plans to Riverside County Emergency Management Department who will forward to California Governor's Office of Emergency Services (CALOES) for review prior to being submitted to the Federal Emergency Management Agency (FEMA). In addition, we will wait to receive an "Approval Pending Adoption" letter from FEMA before taking the plan to our local governing bodies for adoption. Upon approval, the City of Corona will insert the signed resolution.

EXECUTIVE SUMMARY

The purpose of this local hazard mitigation plan is to identify the County’s hazards, review and assess past disaster occurrences, estimate the probability of future occurrences and set goals to mitigate potential risks to reduce or eliminate long-term risk to people and property from natural and man-made hazards.

The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to achieve eligibility and potentially secure mitigation funding through Federal Emergency Management Agency (FEMA) Flood Mitigation Assistance, Pre-Disaster Mitigation, and Hazard Mitigation Grant Programs.

Riverside County's continual efforts to maintain a disaster-mitigation strategy is on-going. Our goal is to develop and maintain an all-inclusive plan to include all jurisdictions, special districts, businesses and community organizations rather than them writing their own plan to promote consistency, continuity and unification.

The County’s planning process followed a methodology presented by FEMA and CAL-OES which included conducting meetings with the Operational Area Planning Committee (OAPC) coordinated by Riverside County Emergency Management Department (EMD) comprised of participating Federal, State and local jurisdictions agencies, special districts, school districts, non-profit communities, universities, businesses, tribes and general public.

The plan identifies vulnerabilities, provides recommendations for prioritized mitigation actions, evaluates resources and identifies mitigation shortcomings, provides future mitigation planning and maintenance of existing plan.

The plan will be implemented upon FEMA approval.

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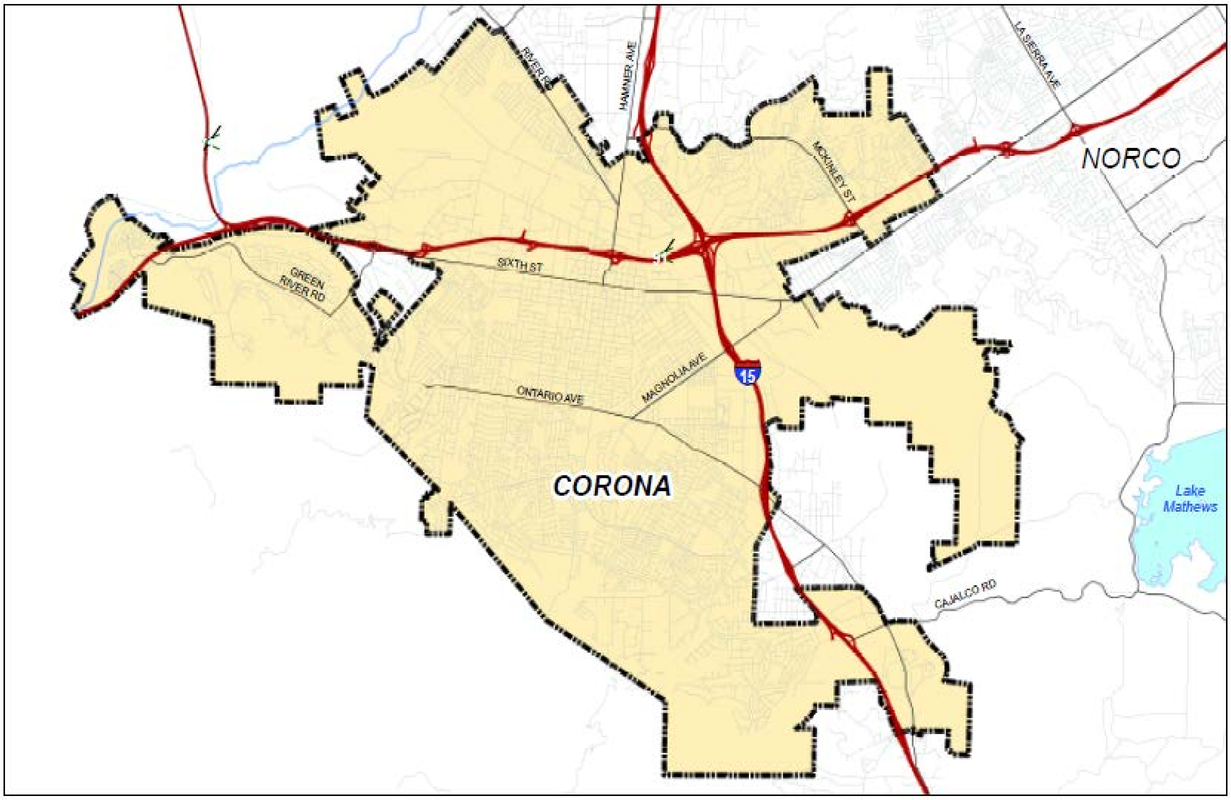
SECTION 1.0 - COMMUNITY PROFILE

1.1 CITY OF CORONA MAP



1.2 GEOGRAPHY AND CLIMATE DESCRIPTION

The City of Corona is located approximately 45 miles southeast of Los Angeles in western Riverside County. It is located in a valley, framed by mountains and the Prado Basin. Original settlements focused development in an area within and adjacent to Grand Boulevard. As the City grew, the geographic limitations imposed by the Cleveland National Forest to the south and the Prado Basin to the northeast created natural barriers that confined the City. The City is bordered by the City of Norco to the north, the City of Riverside to the east, and Riverside County to the west and south.

The City limits encompass 39.2 square miles and the population is approximately 159,132. A city whose heritage spans more than a century, Corona has emerged as an ethnically diverse community, where a significant percentage of the population is made up of young, well-educated families. The Corona community boasts many amenities that provide a first-rate quality of life for residents. The City has more than

394 acres of parks, with sports fields, basketball courts, playgrounds, tennis courts, two skate parks and an outdoor pool.

Two major freeways and one railroad transect Corona. The Riverside Freeway (SR-91) runs east/west directly north of the City's center, Interstate 15 (I-15) runs north/south near the eastern edge of the City, and the railroad parallels SR-91. These corridors are major transportation routes to the economic center of Orange County from the Inland Empire.

Two geographical areas are considered to be within the boundaries of the City of Corona General Plan Planning area, lands within the City's corporate limits, and lands within its Sphere of Influence (SOI). The City currently includes 39.2 square miles, plus 34.3 square miles in Riverside County designated as being within the SOI.

The SOI was defined by the City, the Southern California Association of Governments (SCAG), and the Riverside County Local Agency Formation Commission (LAFCO). It represents the areas likely to be served by and potentially annexed to the City. The SOI includes three geographically distinct areas including the West, East, and South Spheres. The West Sphere encompasses three geographic areas: the Prado Basin, Coronita, and the Foothill area. The East Sphere includes the areas of Home Gardens, Eagle Valley East, and El Cerrito. Temescal Canyon makes up the South Sphere.

The City of Corona Planning area is within the South Coast Air Basin of California. The air basin is a 6,600-square mile area encompassing the non-desert portions of Riverside, Los Angeles, and San Bernardino Counties and all of Orange County. Bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east, the South Coast Air Basin is an area of high air pollution potential.

The climate of the South Coast Air Basin is dominated by the strength and position of the semi-permanent high-pressure center over the Pacific Ocean near Hawaii. It creates the climate conditions typical of Southern California, (i.e., relatively cool summers, mild winters, infrequent rainfall, cool daytime sea breezes, comfortable humidity, and ample sunshine). Periods of extremely hot weather, winter storms, or Santa Ana wind conditions interrupt this pattern. Unfortunately, the same atmospheric processes that create the desirable living climate combine to restrict the ability of the atmosphere to disperse the air pollution generated by the region's population.

The location of the Planning Area, east of the Chino Hills and Santa Ana Mountains, insulates it from the moderating effect of the ocean. Temperatures and precipitation in Corona vary more dramatically than coastal areas of the basin. Average summertime high temperatures range between about 85 to 92 degrees Fahrenheit from June through September, and average wintertime low temperatures are generally near 40 degrees in December and January. Rainfall is highly variable and confined almost exclusively to the winter months. Rainfall in Corona averages about 12.6 inches annually.

Predominating winds travel from the ocean, across the urbanized coastal areas of Orange and Los Angeles Counties, to Corona through the Santa Ana River Canyon. The canyon acts as a funnel for air masses moving across the basin. Daytime winds are typically channeled through the canyon to create steady, abnormally high (greater than 12mph) wind velocities from the west. Typical nighttime conditions reverse, and light winds (less than 1 mph) drift back towards the ocean. Exceptions to this pattern occur when a high-pressure center forms over the western United States and creates the strong, hot, dry, gusty Santa Ana winds, which move through Corona from the eastern deserts into the canyon.

1.3 BRIEF HISTORY

Corona’s historic resources are those physical elements, both structural and natural, which define Corona’s past. They help give the City its unique identity, charm, and orientation. These resources, when well preserved and maintained, provide the community with a sense of permanence, which fosters civic pride and stewardship among its residents and businesses. Information describing the historic and cultural resources were derived from the California Environmental Resources Evaluation Systems (CERES) website, as well as the Riverside County Integrated Project (RCIP) (March 2000) existing setting conditions.

Corona’s history is an evolution of Native American inhabitation, Missionary influence, agricultural development, and eventual rapid urbanization. The City’s growth and development is typical of many other areas in Southern California.

In the early 1700s, prior to the arrival of the Spanish, the Gabrieleno and Luiseno Indians occupied the Corona area. These Native Americans used the hot waters in Temescal Canyon for bathing and religious ceremonies. Current residents and visitors still enjoy the rejuvenating mud baths and hot springs at the Glen Ivy Springs Resort. Luiseno religious ceremonies were strictly followed and remnants of some of their artistic pictographs and petroglyphs can still be found on rocks in undeveloped areas.

In the early 1800s, the agricultural and cattle ranching base developed and portions of Corona became part of the Mexican land grants (Rancho La Sierra Yorba, Rancho Jurupa, Rancho El Rincon, and Rancho El Sobrante de San Jacinto). With the Treaty of Guadalupe Hidalgo (1846), Mexico ceded the Corona area as part of California to the United States. The Yorba, Serrano, Sepulveda, Cot, and Botiller families' ranched sheep and cattle on the original ranchos in the area. Remnants of the Serrano tanning vats are still found on Old Temescal Canyon Road. In 1849, the California gold rush brought prospectors, settlers, and new development to southern California. The Butterfield Stage stops and the Serrano adobes are found along this road.

In 1886, developer Robert Taylor persuaded his partners: Rimpau, Joy, Garretson, and Merrill to form the South Riverside Land and Water Company. Together they raised approximately $110,000 to purchase approximately 12,000 acres of good agricultural land. Taylor realized the importance of water for the soon to be developed community, and additional funds were used to ensure that sufficient water rights were obtained. Taylor hired Anaheim engineer H. C. Kellogg to design a circular Grand Boulevard three miles round. Early residents used to parade their fancy buggies on this circular street that enclosed the main functions of the community: schools, churches, residences, and stores. To the north along the railroad tracks were the manufacturing plants and packing houses. The southern end of town was left to the citrus industry, and the mining companies were established just outside the city's southeastern and eastern city limits.

The town's founders initially named their development South Riverside after the successful citrus community of Riverside, just a few miles away. Almost all of the new settlers planted orange and lemon trees in hopes of gaining future profits. New groves continued to spring up and, by 1912, there were 5,000 acres of established lemon and orange groves. By 1913, Corona shipped more fruit than any other town in Southern California. In 1961, citrus was still considered the backbone of Corona's economy and the largest source of revenue. In that year, citrus covered 7,500 acres. The labor force fluctuated between 400 and 1,800 workers at the peak of the harvest. An additional 500 people worked at the Exchange Lemon Products plant. By 1982, Corona's agricultural industry faced a bleak future as production costs made the economics of farming financially unsuccessful. Plans then began to replace the groves with approximately 12,500 dwelling units.

On July 13, 1896, residents voted to incorporate and change the name of the community to Corona, which is Spanish for crown, in honor of the City's circular Grand Boulevard. By 1900, the population had reached 1,434 people. On

September 9, 1913, in observance of California's Admission's Day, Corona residents celebrated with an international automobile race on the Boulevard. The event attracted such auto racing greats as: Ralph DePalma, Barney Oldfield, Terrible Teddy Tetzlaff, and Earl Cooper. More than 100,000 people came to the town of 4,000 to watch Cooper win the race and a prize of $8,250. It was so successful that races were held again in 1914 and 1916. The demise of the Corona road races was due not only to tragic deaths, which occurred in 1916, but also because of the cost and local effort needed to continually stage such an extravagant event.

1.4 ECONOMY DESCRIPTION

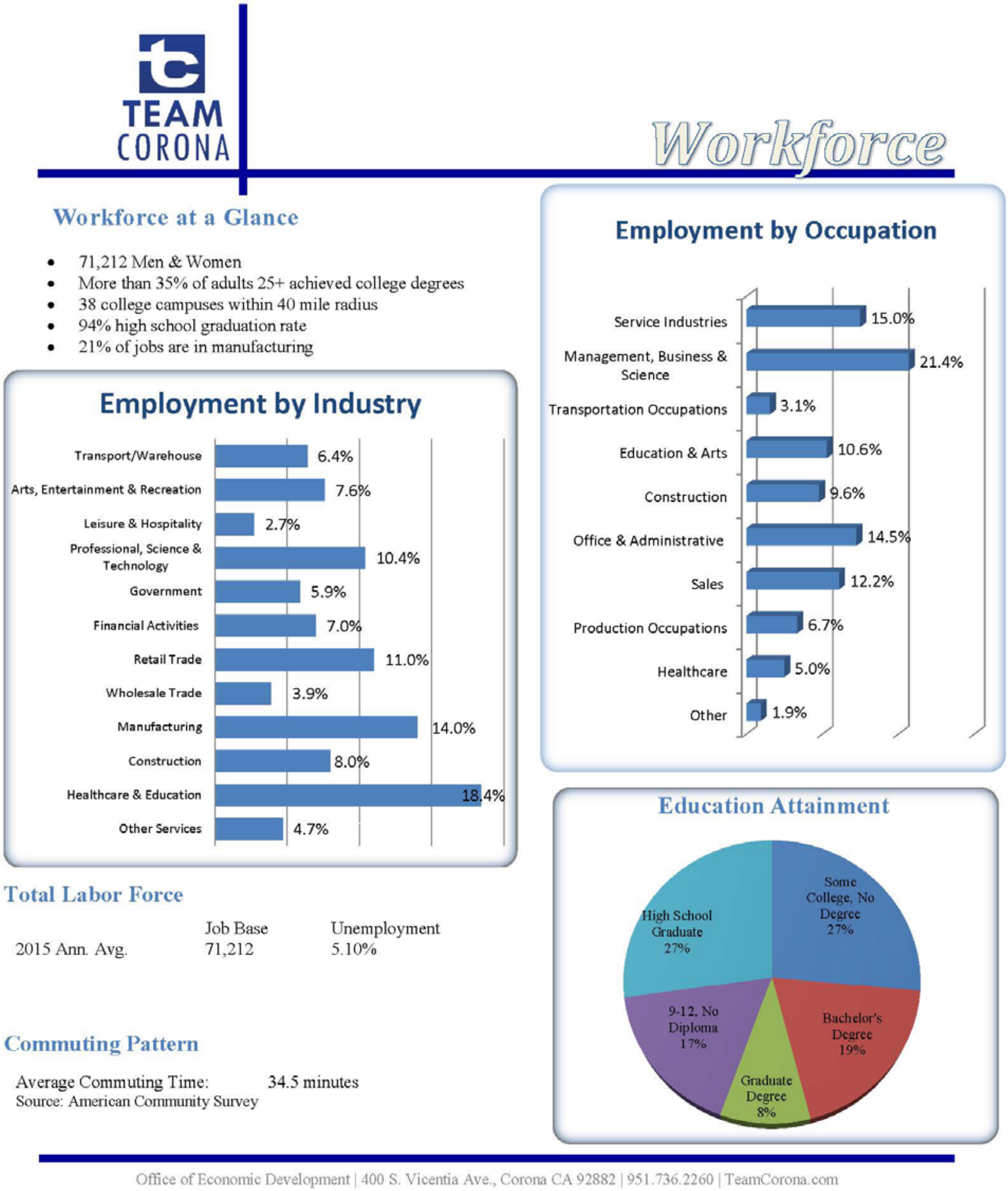
Over the years, the City of Corona has seen dilapidated industrial sites converted to Class A office space and old quarries developed into high-end retail shopping opportunities. Throughout all of this activity, the City of Corona has maintained a quality service-level unmatched in the region.

Corona's economy was built on a strong manufacturing and industrial base, which will benefit in coming years from strong export growth and a weak dollar, in addition to rising demand in the city. Currently, Corona has 34 million square feet of industrial space, more than 8 million square feet of retail, and 3 million square feet of office space. Corona continues to see strong retail sales activity with total retail receipts in excess of $3.4 Billion, a number not seen since the great recession.

Through the years, Corona has maintained the policy that job creation is important for the future of the city. In recent years, this could not have been truer when it comes to vacancy rates within the region. As the space continues to stay occupied, it creates jobs, which in turn creates spendable income in the city. Corona has maintained its position as the dominant leader in Inland Southern California with Industrial vacancy rates approaching 1% and retail vacancy at 4.5% respectably. Corona has four distinct industry clusters: Food Processing, Automotive Aftermarket, R&D Medical & Technology, and Aeronautics. Companies such as Monster Energy, Lucas Oil, and Fender Guitar have expanded several times in recent years. Notably, Veg-Fresh Farms relocated its headquarters to Corona in 2013, to a state of the art temperature controlled facility and added more than 450 Jobs to Corona.

Corona's residential market continues to boom with more than 2,700 homes approved and entitled. Much of this attributed to Corona's Arantine Hills, Corona's newly approved private community consisting of 1,628 single family homes, 65.5 acres of park and open space, as well as a 25 acre retail village. Main Street Metro has given way to a new urban landscape along the North Main corridor adding 860 units in the shape of a fully amenitized mixed use development. While these new exclusive communities attract young affluent families, Corona still boast three-tiers of housing for consumers: executive-level, workforce, and family dwellings, something not found in surrounding communities.

Figure 1.4.1 – City of Corona Workforce



1.5 POPULATION AND HOUSING

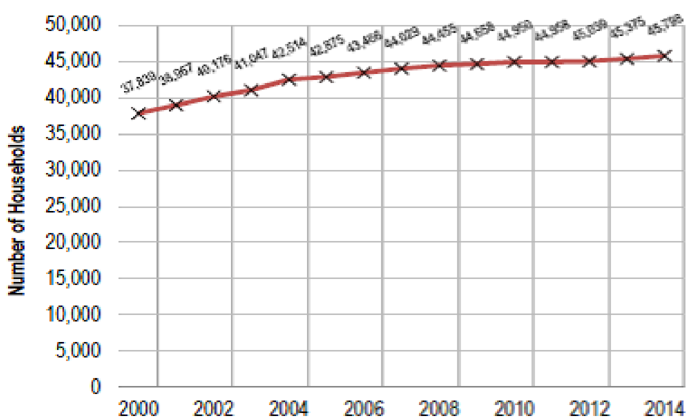
In a little over a century, the City of Corona has evolved from a small town of 1,434 persons with deep agricultural roots to a dynamic, diverse community of in excess of 167,759 persons, an increase in population of 15,385 from the 2010 Census. At the turn of the millennium, Corona's growth had been among the highest in the United States. It's vast agricultural areas at the base of the Santa Ana Mountains, La Sierra Hills, and Chino Hills that centered on a single place of business and civic identity, has evolved to a suburban community of multiple neighborhoods and centers of commerce and employment. The City of Corona's housing units had increased to 48,064 in 2014 from 44,950 in 2010, an increase of approximately 3,114 units.

Figure 1.5.1 – City of Corona Households

III. Households

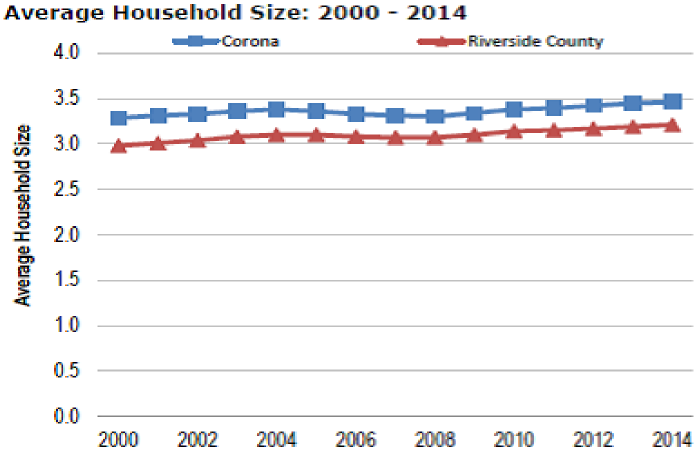
Number of Households (Occupied Housing Units)

Number of Households: 2000 - 2014



Sources: 2000 and 2010 U.S. Decennial Census; California Department of Finance, E-5, 2014

Average Household Size: 2000 - 2014



Source: California Department of Finance, E-5, 2014

- Between 2000 and 2014, the total number of households in the City of Corona increased by 7,959 units, or 21 percent.
- During this 14-year period, the city's household growth rate of 21 percent was lower than the county growth rate of 38.4 percent.
- 6.5 percent of Riverside County's total number of households is in the City of Corona.
- In 2014, the city's average household size was 3.5, higher than the county average of 3.2.

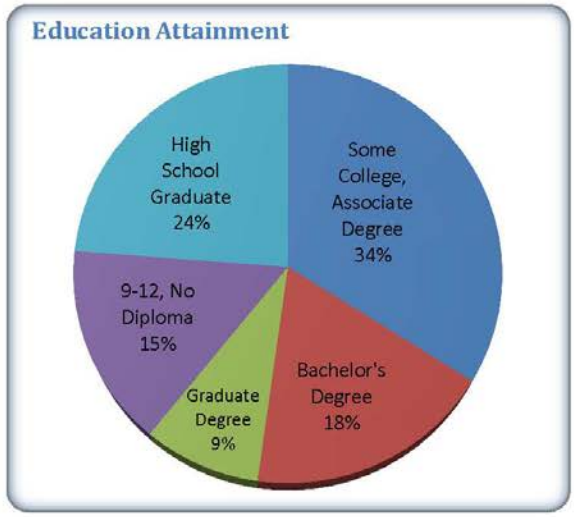
Figure 1.5.2 – City of Corona Demographics

TEAM CORONA

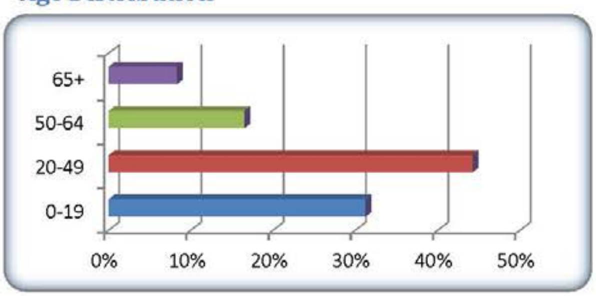
Demographics

Leading Employers

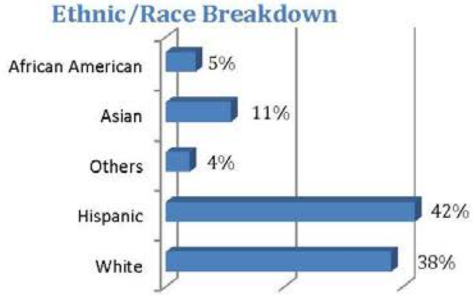
Company	Employment
Corona-Norco Unified School District	5,098
Corona Regional Medical Center	1,113
Kaiser Permanente	995
All American Asphalt	842
City of Corona	749
Fender USA	600
TWR Framing	600
Monster Energy	544
Thermal Structures	500
CoreMark International	421
Dart Container Corp.	420
Veg-Fresh Farms	350
U.S. Food Service	320
Circor Aerospace	300
Advanced Flow Engineering	154



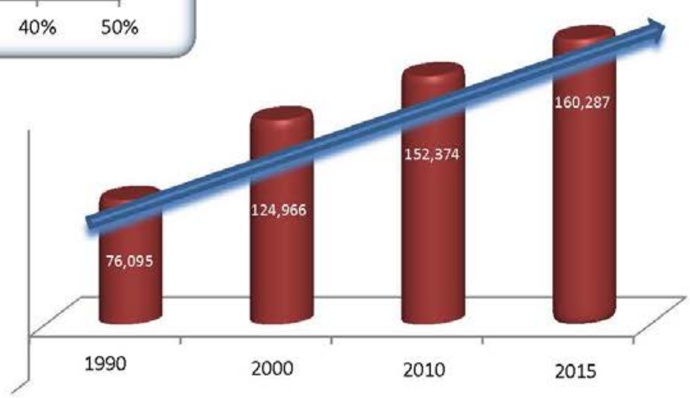
Age Distribution



Ethnic/Race Breakdown



Population Growth



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1.6 DEVELOPMENT TRENDS AND LAND USE

JURISDICTION: CITY OF CORONA	**DOES YOUR AGENCY HAVE RESPONSIBILITY FOR LAND USE AND/OR DEVELOPMENT ISSUES WITHIN YOUR JURISDICTIONAL BOUNDARIES? YES NO**			
	2012 DATA	**2017 DATA**		**2022**
Current Population in Jurisdiction or Served	153,649	167,759	Projected Population in Jurisdiction or Served - in 2022	175,000
Current Sq. Miles in Jurisdiction or Served	39.2	39.2	Projected Sq. Miles in Jurisdiction or Served - in 2022	39.2
Does Your Jurisdiction have any ordinances or regulations dealing with disaster mitigation, disaster preparation, or disaster response?	Yes	Yes	If yes, please list ordinance or regulation number. Ordinance No. 2429, 1973, 2077 Corona Municipal Code Chapters 2.52, 3.36, 4.04.80, 7a, 15.12.270 Section 705	
What is the number one land issue your agency will face in the next five years	Economy and Infill/compact development			
Approximate Number of Homes/Apts/etc.	47,182	48,930	Projected Number of Homes/Apts/etc.- in 2022	50,500
Approximate Total Residential Value	$16.3 billion	$17.0 billion	Projected Residential Total Value - in 2022	$19.0 billion
Approximate Number of Commercial Businesses	5,205	9,000	Projected Number of Commercial Businesses - in 2022	9,500
Approximate Percentage of Homes/Apts/etc. in flood hazard zones	0.7%	0.7%	Approximate Percentage of Homes/Apts/etc. in flood hazard zones - in 2022	0.7%
Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones	3.5%	3.5%	Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones - in 2022	3.5%
Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones	6.55%	6.55%	Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones - in 2022	6.55%
Approximate Percentage of Commercial Businesses in flood hazard zones	0.003%	0.7%	Approximate Percentage of Commercial Businesses in flood hazard zones - in 2022	0.7%
Approximate Percentage of Commercial Businesses in earthquake hazard zones	1.9%	0.3%	Approximate Percentage of Commercial Businesses in earthquake hazard zones - in 2022	0.3%
Approximate Percentage of Commercial Businesses in wildland fire hazard zones	4.5%	0	Approximate Percentage of Commercial Businesses in wildland fire hazard zones - in 2022	0
Number of Critical Facilities in your Jurisdiction that are in flood hazard zones	0	0	Projected Number of Critical Facilities in your Jurisdiction that are in flood hazard zones - in 2022	0
Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones	2	2	Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones - in 2022	2
Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones.	7	7	Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones - in 2022	7
Does your jurisdiction plan on participating in the County's on-going plan maintenance program every two years as described in Part I of the plan?	Yes	Yes	If not, how will your jurisdiction do plan maintenance? N/A	
Will a copy of this plan be available for the various planning groups within your jurisdiction for use in future planning and budgeting purposes?				Yes

Corona's residential market continues to boom. Included in planned construction are three new housing developments that will be adjacent to high fire hazard severity zones. It is mandated that new development in or adjacent to these zones are in compliance with the 2016 California Building Code Chapter 7A, and Chapter 49 of the 2016 California Fire Code. It is also mandated that a separate fuel modification plan be submitted for review and approval by Corona Fire Department.

SECTION 2.0 - PLANNING PROCESS

2.1 LOCAL PLANNING PROCESS

Representatives from multiple City departments contributed in the updating of the 2012 Local Hazard Mitigation Plan. Personnel involved included senior management and staff from the Fire Department, Police Department, Community Development, Public Works, Administrative Services, Department of Water and Power, Management Services, Maintenance Services, Library and Recreation, Information Technology, City Clerk, and Legal and Risk Management. The group was made up of civil engineers, planners, building officials, city clerk, public information officer, GIS administrator, accountants, managers, emergency managers, analysts, and fire and police officials. Outreach to these key players was done so via, email, phone calls and in person meetings.

The group assisted in the development of mitigation strategies and projects based on the risk and hazard ranking assessment conducted by members of Fire, Police, Public Works, and Department of Water and Power. They identified completion of past projects, and provided updated City data and statistics. For meetings and correspondence reference local planning efforts, see Appendix A.

2.2 PARTICIPATION IN REGIONAL (OA) PLANNING PROCESS

The City of Corona committed to participate in the update of the 2012 Riverside County Multi-jurisdiction Hazard Mitigation Plan. An agency multi-jurisdiction participation form was completed and submitted to Riverside County Emergency Management Department as official notice of participation.

Emergency Management staff attended multiple Operational Area Planning Committee meetings over the course of the planning year where LHMP updates, requirements, and coordinating efforts were conducted. Neighboring communities were invited to participate in the update of the LHMP during these quarterly Operational Area Planning Committee (OAPC) meetings. Several of Corona's neighboring communities were in the process of updating their respective LHMP's, this allowed the city to cross reference mitigation hazards and risks and identify potential mitigation projects that may lead to future collaborate efforts.

Corona Emergency Management staff attended multiple LHMP workshops hosted by EMD that provided additional information, review, guidance and assistance throughout the plan's updating process. These workshops consisted of representatives from various disciplines such as law, fire, hospitals, and schools lending to a well-rounded planning process. These entities were invited by EMD to participate in these workshops via Operational Area emailing distribution lists and calendar invites.

Emergency Management staff also attended a two day course hosted by EMD which provided plan developers information necessary to prepare and implement a local Hazard Mitigation Plan. This course lent to additional coordinated efforts among other Operational Area Emergency Managers in attendance as well as EMD representatives.

In addition to these group settings, the Corona Emergency Services Coordinator had multiple one on one meetings and email correspondence with EMD planning staff. For meetings and correspondence reference OA planning efforts, see Appendix A.

2.3 DATES AVAILABLE FOR PUBLIC COMMENT

In an effort to involve the residents of Corona in the update process, and to better understand their concerns and opinions regarding hazards threatening their community and the City as a whole, a survey was developed and the 2012 plan was provided for review. In an attempt to reach a large number of community members, the plan and survey were posted on the City's website, as well as on social media. The post on the Corona Fire Department Facebook page, which contained the survey and plan, reached over 3,527 individuals.

In addition to these efforts, LHMP information and input was given and received at multiple community meetings.

No new hazards outside of the current contents of the 2012 LHMP were identified. For public notice documentation, see Appendix A.

2.4 PLANS ADOPTED BY RESOLUTION

Upon approval by FEMA, the LHMP will be presented to the Corona City Council in a public meeting for adoption via an official Resolution.

SECTION 3.0 – MITIGATION ACTIONS/UPDATES

3.1 UPDATES FROM 2012 PLAN

The City of Corona has reviewed the previous plan and has determined there are no new hazards since approval of the 2012 Local Hazard Mitigation Plan. For a complete definition of the hazards, please refer to the Riverside County Multi-Jurisdictional Hazard Mitigation Plan in Section 3.0.

Although no new hazards have been identified, the occurrence or severity of some of these hazards has increased, making them a greater mitigation priority than in previous years. Examples of these heightened risks include drought and climate change, occurrence and threat of pandemic outbreaks, and the threat and occurrence of terrorists' acts, both foreign and domestic. See Section 3.3 – New Hazards or Changes From 2012.

3.2 LIST OF COUNTY AND CITY HAZARDS

The City of Corona is committed to providing protection to residents and businesses from natural and human induced hazards. The City is also committed to coping with and rebuilding from emergency or disaster events in a manner that is efficient, safe, and provides for a quick return to the quality of life that exists daily in Corona. To accomplish this it is imperative that the City is aware of the hazards it is susceptible to in order to prepare, respond, recover, and mitigate for them.

The County of Riverside identified, evaluated, and ranked 23 natural and human-induced public safety risks that could have an impact on the health, safety, and social well-being of the community. The ranking was based on severity of damage and probability of occurrence for each risk. The City of Corona then ranked the same 23 hazards and included the top 10 risks in the City's annex to the Riverside County Multi-Jurisdictional Hazard Mitigation Plan. Identifying the risks posed by these hazards and developing strategies to reduce the impact of these hazards can assist in protecting life and property.

All 23 hazards are not individually addressed in the City of Corona's annex. For those hazards not expanded upon, the City feels that the County Plan provides adequate information to address the hazard as it relates to the City. Below are two tables, one listing the 23 identified hazards with their probability and severity rates and the second the County and City final ranking of the hazards.

Figure 3.2.1 – City of Corona and County Hazard Ranking

City of Corona & Riverside County Hazard Ranking		
Hazard	**Corona**	**County**
Earthquake	1	1
Wildland Fire	2	3
Electrical Failure	3	4
Terrorist Event	4	7
Water Supply Disruption/Contamination	5	23
Flood	6	9
Emergent Disease/Contamination	7	5
Transportation Failure	8	14
Communications Failure	9	8
Pandemic Flu	10	2
Cyber Attack	11	6
Pipeline Disruption	12	20
Extreme Weather	13	13
HazMat Incident	14	22
Dam Failure	15	15
Civil Disorder	16	10
Nuclear/Radiological Incident	17	12
Insect Infestation	18	18
Drought	19	11
Landslide	20	21
Jail/Prison Event	21	19
Aqueduct	22	16
Tornado	23	17

Figure 3.2.2 – Hazard Probability and Severity Rates

HAZARD	PROBABILITY	SEVERITY	HEALTH SYSTEM IMPACT			MITIGATION CAPACITY		RISK SCORE
			HEALTHCARE	EMS	BEHAVIORAL / MENTAL HEALTH	RESPONDER AGENCIES	COMMUNITY AGENCIES	
	Improbable: 0 Remote: 1 Occasional: 2 Probable: 3 Frequent: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Negligible: 1 Marginal: 2 Critical: 3 Catastrophic: 4	NA: 0 Low: 1 Moderate: 2 High: 3 Extreme: 4	NA: 0 Low: 1 Moderate: 2 High: 3 Extreme: 4	
Aqueduct	2	3	2	2	2	2	3	0.38
Drought	3	3	2	2	2	2	2	1.13
Earthquake	2	4	4	4	3	2	2	3.50
Extreme Weather	2	3	2	2	2	2	2	0.75
Flood	3	3	2	3	2	2	3	1.13
Insect Infestation	3	2	2	1	1	2	2	0.00
Landslide	3	3	1	1	1	2	2	-0.56
Tornado	1	2	2	2	2	2	2	0.25
Wildland Fire	4	3	3	3	3	3	3	2.25
Civil Disorder	2	3	3	3	1	4	0	1.13
Communications Failure	2	3	3	3	3	3	3	1.13
Cyber Attack	4	2	3	2	2	3	1	1.50
Dam Failure	1	3	2	3	2	2	3	0.38
Electrical Failure	4	4	2	2	2	2	2	2.00
HazMat Incident	4	3	2	2	1	3	3	-0.75
Jail/Prison Event	1	2	1	1	1	4	0	-0.13
Nuclear Incident	1	4	2	3	3	2	2	1.00
Pipeline Disruption	2	3	2	2	1	3	3	-0.38
Radiological Incident	1	2	2	3	3	2	2	0.50
Terrorist Event - MCI	1	3	3	3	4	3	1	1.13
Transportation Failure	2	3	2	2	1	2	2	0.38
Water Supply Disruption/Contamination	3	2	0	0	0	2	2	-1.50
Emergent Disease/Contamination	3	3	3	3	2	3	2	1.69
Pandemic Flu	2	4	4	4	4	3	2	3.50

3.3 NEW HAZARDS OR CHANGES FROM 2012

Although no new hazards have been identified from the approval of the 2012 Local Hazard Mitigation Plan the occurrence or severity of some of these hazards has increased, making them a greater mitigation priority than in previous years. These heightened risks include drought and climate change, occurrence and threat of pandemic outbreaks, and the threat and occurrence of terrorists acts both foreign and domestic.

1. Drought – Drought is a period of time of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or underground). Droughts are slow-onset hazards, but overtime, they can severely affect crops, municipal water supplies, recreation resources, and wildlife. If drought conditions extend over a number of years, the direct and indirect economic impacts can be significant. High temperatures, high winds, and low humidity can worsen drought conditions and make areas more susceptible to wildfires. In addition, human actions and demands for water resources can be accelerate drought-related impacts.

2. Climate Change – Climate change may well be the pre-eminent challenge of our time and it is already having a significant and measurable impact on California's environment. These impacts include decreasing spring snowmelt runoff, rising seas levels, shrinking glaciers, increasing wildfires, warming lakes and oceans, and the gradual migration of many plants and animals in higher elevations. Weather patterns are becoming more variable, causing more severe winter and spring flooding and longer drier droughts. Climate Changes has already impacted California's water resources. In the future, warmer temperatures, different patterns of precipitation and runoff, and rising sea levels will profoundly affect the ability to manage water supplies and other natural resources.

3. Pandemic – An influenza pandemic is a global outbreak of a new influenza A virus. A novel influenza A virus is one that has caused human infection, but is different from current seasonal human influenza A viruses spreading among people. Novel influenza A viruses can be viruses that originate in animals that gain the ability to infect humans or human viruses that change significantly so as to be different from current human seasonal influenza A viruses. Some novel flu A viruses are believed to pose a greater pandemic threat than others and are more concerning to public health officials because they have caused serious human illness and death and also have been able to spread in a limited manner from person-to-person. Novel influenza A viruses are of extra concern

because of the potential impact they could have on public health if they gained the ability to spread from person-to-person easily, triggering a pandemic. Three subtypes of avian influenza A viruses H5, H7 and H9, along with variant viruses H1N1v, H3N2v and H1N2v are currently most concerning to public health officials.

4. Terrorism – Terrorism, as defined by the FBI, is "the unlawful use of force against persons or property to intimidate or coerce a government, the civilian population or any segment thereof, in the furtherance of political or social objectives. The tactics of terrorism are diverse. As important as the actual attacks is the cultivation in the target population of the fear of such attacks, so that the threat of violence becomes as effective as actual violence. Terrorist tactics tend to favor attacks that avoid effective countermeasures and exploit vulnerabilities. As such, terrorists have the potential to utilize many different types of tactics both conventional and unconventional. Some of these tactics include shootings, kidnappings, bombings, suicide attacks, bioterrorism, agro terrorism, nuclear terrorism, and cyberterrorism. From 2010 to 2016 there have been roughly 40 confirmed domestic terrorist incidents.

3.4 BRIEF STATEMENT OF UNIQUE HAZARDS

The City of Corona faces a diverse array of potential natural and human caused hazards. As with most cities in the Inland Empire, one of the primary concerns is the impact of a large earthquake in the region. Flood risks are also a real concern with several creeks, washes, channels, and flood zones, contained in the planning area of Corona. In addition, the City is nearly surrounded by hills and mountains with the potential and the history of large wildland fires. The shared boundary between the City and the Cleveland National Forest is about 12 miles in length.

The City of Corona's extensive transportation network which includes state highways, public transit, rail lines, and municipal airport provide additional associated incident risks that may cause severe injuries and/or deaths. They could also cause burns and/or illness due to exposure to fires and/or potential hazardous materials on board. Two major freeways and one railroad transect Corona. The Riverside Freeway (SR-91) runs east/west directly north of the City's center, Interstate 15 (I-15) runs north/south near the eastern edge of the City, and the railroad parallels SR-91. These corridors are major transportation routes to the economic center of Orange County from the Inland Empire. The Corona Municipal Airport is home to 350-400 general aviation aircraft and is strictly a recreational airport with no commercial flights. Although small, the airport is extremely active, with approximately 50,000 annual operations. The City's transportation network of roads, freeways, rail lines and airport has been a priority in the city’s planning and mitigation efforts.

Since the original 2005 version of the Local Hazard Mitigation Plan was submitted, the City of Corona has experienced seven federally declared disasters for wildland fires and floods, and an additional State declaration for high winds. Five additional major wildland fires occurred in or around the City of Corona that threatened the community. A list of Historical Disasters for City of Corona is included in the following table.

Figure 3.4.1 - Historical List of Disasters for City of Corona

Disaster Type	Year	Corona Disasters Description of Damage	Fiscal Impact	Federal Disaster Declared
Fire	1889	Santiago Canyon Fire – 300,000 acres of wildland fire from Santa Ana to Elsinore, Corona to Oceanside in 3 days.	Unknown	Unknown
Flood	1938	Flooding included the intersection River Road and Main Street.	$100,000	Unknown
Fire	1948	Green River Fire – 46,000 acres of wildland and 22 homes destroyed.	Unknown	Unknown
Fire	1967	Paseo Fire – 50,000 acres wildland and 66 homes destroyed.	Unknown	Unknown
Flood	1969	City was declared a local disaster area. One hundred twenty five residents were evacuated. Twenty homes were damaged.	$750,000	Yes
Freeze	1969	An ice freeze destroyed 75% of Corona's avocado crop; 50% of its lemons; 35% of Valencia oranges; 25% Navel oranges and 20% grapefruit	$8 million (Riverside County)	Unknown
Fire	1977	Tin Mine Fire - 5,500 acres burned. 1,500 firefighters fought fire at the peak of the fire. 1,610 avocado and fruit trees consumed by fire.	$5.9 million	Unknown
Flood	1978	Water line broken, 100 residents without drinking water; sewer line washed out; airport flooded.	$500,000	Unknown
Fire	1979	Paseo Fire - 2,000 acres burned. 100 people evacuated from homes. No significant property damage.	Unknown	Unknown
Fire	1980	Owl Fire - Wildland	Unknown	Unknown
Flood	1980	Street damage, airport damage, property damage.	$1.6 million	Unknown
Fire	1982	Gypsum Fire – 18,000 acres, 14 homes destroyed.	Unknown	Unknown
Fire	1982	Hagador Fire – Wildland fire, South Corona	Unknown	Unknown
Fire	1987	Silverado Fire – Wildland fire, south Corona	Unknown	Unknown
Fire	1990	Bedford Fire - south of Corona 4,500 Acres, 20 structures. FEMA DR 872	Unknown	Yes
Winds	1990	Powerful winds knocked out power supply to 1,580 homes for as long as two hours.	Unknown	Unknown
Freeze	1991	Crop Freeze-10 nights of temperatures below 27 F. Damage to avocados and citrus.	Unknown	Yes
Flood	1993	Washed out roads, knocked down dikes and damaged public property.	$1.525 million	Unknown
Flood	1998	Flooding to roads, airport, fallen trees El Nino FEMA DR	$650,000	Yes
Fire	1999	Chase Fire - Brush fire burns 500 acres near Skyline Drive. One home destroyed.	Unknown	Unknown

Disaster Type	Year	Corona Disasters Description of Damage	Fiscal Impact	Federal Disaster Declared
Fire	2002	Green Fire – Wildland fire Santa Ana River Canyon.	Unknown	Unknown
Fire	2002	Evening Fire – Wildland fire Santa Ana River Canyon.	Unknown	Unknown
Flood	2005	FEMA DR 1577 – Flooding citywide, airport, Debris flow and mudslides.	$353,928	Yes
Fire	2005	Lincoln Fire – 800 acres wildland Eagle Valley.	Unknown	Unknown
Fire	2006	Sierra Fire – 10,600 acres Santa Ana River Canyon.	Unknown	Unknown
Fire	2007	Santiago Fire - west of Corona 27,000 acres and destroyed more than a dozen homes. FEMA DR 1731	$52,118	Yes
Winds	2007	Fallen trees and debris. State declaration CDAA DR	$18,616	Yes
Fire	2007	Cerrito Fire – Wildland fire, Eagle Valley.	Unknown	Unknown
Fire	2008	Freeway Fire – 18 homes damaged or destroyed in the Green River Homes caused by fire near Santa Ana River. FEMA DR 1810	$78,936	Yes
Flood	2010	Flooding, slope failures, fallen trees and road damage. FEMA DR 1884	$177,000	Yes
Fire	2010	McKinley Fire – Wildland fire, Eagle Valley.	Unknown	Unknown
Flood	2011	Flooding and damage to roads, fallen trees, airport flooding and damage. FEMA DR 1952	$370,000	Yes
Fire	2015	Highway Fire – 1,049 acres Hwy71/Hwy91 near Prado Basin	Unknown	No
Flood	2015	Heavy down pore causing flooding and civilian water rescues	Unknown	No
Flood	2017	Flooding and damage to PD facility and fallen trees. FEMA DR 4305	$67,000	Yes

3.5 MITIGATION PROJECT UPDATES

Sense the adoption of the 2012 LHMP the City of Corona has undertaken several measures, and has completed several projects in an effort to lessen the impact of disasters and prevent the loss of life and property. Some of these mitigation actions are identified in the table below.

Figure 3.5.1 – Mitigation Projects Completed

Hazard Type	Project Description	Status
All	Incorporated 2012 Approved Local Hazard Mitigation Plan with City of Corona General Plan	Complete
Fire, Water Supply Disruption	Updated Booster Station buildings to current fire standards (Kraft Ranch, Montana Ranch,SDO, Maybe Canyon,Eagle Glen, Harlin Hills)	Complete
Fire	Purchased 6 portable booster stations for emergency fire response	Complete
Earthquake	All above ground steel storage reservoirs were evaluated to ensure proper venting in the event of an earthquake. Modifications were made where needed.	Complete
Earthquake, Electrical Failure	Installation of emergency generators for 3 groundwater well sites.	Complete
Electrical Failure, Emergent Disease Contamination	Emergency generators installed at all lift stations, plus a portable sewage lift station for emergency bypass	Complete
Flood	Annual maintenance service on storm drains	Complete
Flood	Construction of Main St storm drain. Alleviate flooding from 11th to 8th St.	Complete
Flood	Construction of Harris storm drain. Alleviate flooding on 6th St and apartments of 5th St..	Complete
Water Supply/ Contamination	Converted out of service well to a triple-nested monitoring well. Will increase local ground water supply.	Complete
Water Supply Disruption/ Contamination	Replaced 4,700 feet of 6 and 8 inch waterlines with 12 inch Ductile Iron Waterline pipe	Complete
Flood	Cota Channel restoration	Complete
Terrorism	Became members of the BioWatch Program - BioWatch provides early detection of biological agents in the air used for a bioterrorism attack	Complete
Terrorism	Corona PD & Fire established a Tactical Response to Violent Incidents Team and adopted the RCFCA Standard Operating Guidelines	Complete
Pandemic Flu	Partnered with Riverside County Public Health with the development and implementation of the City of Corona Pandemic Influenza Plan	Complete
HazMat, Transportation Failure, Fire	2013 complete update to Hazardous Material Area Plan - to assist in the prevention or mitigation of damage from the release or threatened release of hazardous materials.	Complete

Hazard Type	Project Description	Status
Water Supply Disruption/ Drought	2015 complete update to the Urban Water Management Plan - conservation and efficient water use	Complete
Water Supply Disruption/ Drought	Instituted multiple residential water conservation programs, resulting in a nearly 20% reduction over the declared drought period	Complete
Flood/Water Supply Contamination	2017 complete update to Sewer System Management Plan - preventative maintenance, schedule, response plan	Complete
Transportation Failure	2012 development of Neighborhood Traffic Management Program	Complete
Transportation Failure	2014 development of Corona Municipal Airport Emergency Plan	Complete
Climate Change/Drought, Emergent Disease	2012 developed the City of Corona Climate Action Plan - reduce GHG emissions	Complete
Fire	2015 implementation of a Suppression Inspection Action Plan - facilitates the completion of hazard reduction inspections	Complete
HazMat, Fire	Contracted with G & G Environmental to ensure all on-site hazardous material inspections were completed within required timeframe.	Complete
Communications Failure/Fire	2015 complete update to the SOLAR - Multi-County Mutual Threat Zone Guide	Complete
Communications Failure/Fire	2015 update to the Corona Fire Radio Guide - Internal and external agency communications	Complete
All	Fire Department Annual Master Training Plan - improves the safety and performance of Department's members in order for them to prevent or minimize loss of life, damage to the environment and loss of property.	Complete
All	2015 update to the Corona Fire Department Emergency Medical Services Quality Improvement Program - delivery of consistent, high quality, compassionate pre-hospital patient care.	Complete
All	Police Department Annual Master Training Plan - improves the safety and performance of Department's members in order for them to prevent or minimize loss of life, damage to the environment and loss of property.	Complete
All	2017 implementation of the new Emergency Medical Dispatch Program - delivery of pre arrival medical direction	Complete

SECTION 4.0 – HAZARD IDENTIFICATION AND RISK ASSESSMENT

4.1 CRITICAL FACILITIES AND INFRASTRUCTURES

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Corona is included in the table below.

Figure 4.1.1 – Critical Facilities for City of Corona

Critical Facilities Type	Number
Public Safety Dispatch	1
Emergency Operations Center	1
City Services	2
Fire Stations	7
Water Reservoirs	15
Water Treatment Plants	3
Waste Water Treatment Plants	3
Hospitals	2
Police facility	1
Maintenance Yards	1
Senior Care	11
Schools	27
Radio Repeaters	7

4.2 ESTIMATING POTENTIAL LOSS

The most vulnerable structures in the City are downtown, the fire station, City Hall, Cabots Pueblo Museum, and other unreinforced structures. These facilities are the weakest in the city. The close proximity to the San Andreas Fault is sure to cause damage to any of these facilities in the event of a major earth quake.

Refer to Riverside County Operational Area MJHMP Section 4.2 property loss value for the City of Corona.

(See Appendix B - Development Trends Questionnaire)

4.3 TABLE REPLACEMENT VALUES

Figure 4.3.1 – Assets Table/Replacement Value for City of Corona

Name of Asset	Replacement Value ($)	Occupancy/ Capacity #	Hazard Specific Info.
City Hall	$45,094,961	N/A	Unsecured Perimeter
Fire Stations (7)	$25,200,000	N/A	Unsecured Perimeters
Police Department	$15,154,127	N/A	Close proximity to railroad
Emergency Operations Center	$15,976,093	N/A	Close proximity to railroad

4.4 IDENTIFICATION OF RISKS AND VULNERABILITIES

The County of Riverside identified, evaluated, and ranked 23 natural and human-induced public safety risks that could have an impact on the health, safety, and social well-being of the community. The ranking was based on severity of damage and probability of occurrence for each risk. The City of Corona then ranked the same 23 hazards and included the top 10 risks in the City's annex to the Riverside County Multi-Jurisdictional Hazard Mitigation Plan. Below are the top ten hazards in order of ranking. For a complete list of hazards, their probability and severity see Figure 3.2.1 – Hazard Probability and Severity Rates

1. Earthquake

The City of Corona is considered to be seismically active, as is most of Southern California. Several known active or potentially active faults are located in and around Corona. The Elsinore Fault zone is the closest major fault system to the City and one of the largest in Southern California. Historically, the Elsinore Fault zone has also been one of the least active systems. At its northern end, near the City, the Elsinore Fault zone splays into two segments, the Chino-Central Avenue Fault and the Whittier Fault. Along the southwestern portion of the City the Elsinore Fault zone is referred to as the Glen Ivy Fault. See Figure 4.4.1 – Earthquake Fault Zones.

Ground surface rupture due to active faulting is considered possible in the western portion of the City where known active or potentially active faults are mapped. Geological evidence indicates that the Glen Ivy and portions of the Whittier Faults are active and that the Chino-central Avenue Fault is potentially active.

Historically, the Corona region has generally been spared a major destructive earthquake. However, based on a search of earthquake databases of the USGS National Earthquake Information Center, several major earthquakes (magnitude 6.0 or more) have been recorded within approximately 100 kilometers of the City since 1769. The City's General Plan Public Health and Safety Element have identified various implementation programs with respect to fault rupture and other geologic disturbances. These programs specify various requirements including: detailed geologic investigations are to be conducted in conformance with guidelines of the California Division of Mines and Geology (CDMG), for all construction of transportation infrastructure in an Alquist-Priolo Special Study Zone; construction of essential facilities within 200 feet of an active fault or potentially active fault; and field information is to be developed as part of any CEQA investigations, and geologic reports by the City and/or County geologists should be kept current and accessible for use in report preparation, geologic reviews, and policy development.

Additionally, the City's General Plan Public Health and Safety Element have identified various implementation programs to be carried out by the City and county affecting seismic safety of critical facilities. These programs include: detailed site studies for fault future potential are to be conducted as background to the design process for critical facilities under City and county discretionary approval; existing critical facilities are to be reviewed for any significant siting, design, or construction problems that would make them vulnerable in an earthquake. The findings shall be incorporated into emergency operation plans as well as addressed in longer-term programs of facilities upgrading or relocation unless satisfactorily demonstrated that a building setback from an active or potentially active fault will not adversely impact public health, safety, and welfare. New Essential Facilities shall not be located within 200 feet of an active fault or potentially active fault. (See Riverside County OA MJHMP Section 4.0)

2. Wildland/Urban Fire

The combination of population density, weather, and growing residential and commercial development presents a potential year-round threat of conflagration. Late spring through early fall months are commonly referred to as the "Fire Season."

The City of Corona is nearly surrounded by hills and mountains with the potential and the history of large wildland fires. To the south, the City sits at the base of the Santa Ana mountain range, and borders against the Cleveland National Forest. The shared boundary between the City and the Forest is about 12 miles in length. The fuels are heavy brush with oaks, sycamore and pines on the slopes and drainages. Residential structures are immediately adjacent to this forest area throughout the entire boundary. Some are newer construction with good clearances, and some are much older with less clearance.

The western portion of the City sits at the base of Prado Dam which is the headwater for the Santa Ana River Canyon. The Santa Ana Canyon's steep topography and East-West alignment serve as a wind funnel. The geography increases the wind's speed and magnifies the effects of fire on the available fuel bed, contributing to the rapid rate of fire spread. The northern side of this canyon comprises primarily light flashy fuels due to frequent burning and fuel type-conversion, and the southern side comprises primarily of heavy brush. There is significant fire history in this canyon area. The 91 Freeway parallels the Santa Ana River throughout the canyon. There are areas of development where structures sit adjacent to wildland areas throughout the western areas of the City.

The northwest area of the City sits in the Prado Basin behind the Prado Dam and there are several developments that adjoin some heavy fuels.

The northeast area sits in the Corona Hills, and developments are built up to and on top of the hills. These hills comprise primarily of light flashy fuels due to frequent burning and type-conversion.

The eastern edge of the City is bordered by hills and Eagle Valley. This area has not been developed and is comprised of light flashy fuels due to frequent burning and type-conversion. Fires occur frequently, but there is very little structural threat.

In addition to interface areas within the City Limits, many of these areas also have significant residential development in unincorporated areas that are immediately adjacent to the City.

Over the years, there have been several significant fires, many of sizeable acreage, within the City or areas just outside its borders. Many of these fires have resulted in destroyed and damaged structures. (See Riverside County OA MJHMP Section 4.0)

Weather

Weather patterns combined with certain geographic locations can create a favorable climate for wildfire activity. Areas where annual precipitation is less than 30 inches per year are extremely fire susceptible. High risk areas in Southern California share a hot, dry season in late summer and early fall when high temperatures and low humidity favor fire activity. The frequent occurrence of 40-50 mile per hour Santa Ana or foehn winds, coupled with temperatures in excess of 90 degrees, relative humidity of 20 percent or less and dense and extremely dry ground cover in inaccessible mountain or canyon areas causes the kinds of wildland fires Southern California experiences every year.

Topography

Topography has considerable effect on wildland fire behavior and on the ability of firefighters and their equipment to take action to suppress those fires. Simply because of topography, a fire starting in the bottom of a canyon may expand quickly to the ridge top before initial attack forces can arrive. Rough topography greatly limits road construction, road standards, and accessibility by ground equipment. Steep topography also channels airflow, creating extremely erratic winds on leeward slopes and in canyons. Water supply for fire protection to structures at higher elevations is frequently dependent on pumping units. The source of power for such units is usually from overhead distribution lines, which are subject to destruction by wildland fires.

Vegetation

A key to effective fire control and the successful accommodation of fire in wildland management is the understanding of fire and its environment. Fire environment is the complex of fuel, topographic, and air mass factors that influence the inception, growth, and behavior of a fire. The topography and weather components are, for all practical purposes, beyond man’s control, but it is a different story with fuels, which can be controlled before the

outbreak of fires. In terms of future urban expansion, finding new ways to control and understand these fuels can lead to possible fire reduction.
Of these different vegetation types, coastal sage scrub, chaparral, and grasslands reach some degree of flammability during the dry summer months and, under certain conditions, during the winter months. For example, as chaparral gets older, twigs and branches within the plants die and are held in place. A stand of brush 10- to 20- years of age usually has enough dead material to produce rates of spread about the same as in grass fires when the fuels have dried out. In severe drought years, additional plant material may die, contributing to the fuel load.

Wildfire Characteristics

There are three categories of interface fire: The classic wildland/urban interface exists where well-defined urban and suburban development presses up against open expanses of wildland areas; the mixed wildland/urban interface is characterized by isolated homes, subdivisions and small communities situated predominantly in wildland settings; and the occluded wildland/urban interface exists where islands of wildland vegetation occur inside a largely urbanized area. Certain conditions must be present for significant interface fires to occur. The most common conditions include: hot, dry and windy weather; the inability of fire protection forces to contain or suppress the fire; the occurrence of multiple fires that overwhelm committed resources; and a large fuel load (dense vegetation). Once a fire has started, several conditions influence its behavior, including fuel, topography, weather, drought and development. Southern California has two distinct areas of risk for wildland fire: the foothills and lower mountain areas which are most often covered with scrub brush or chaparral and the higher elevations of mountains with heavily forested terrain.

Wildfire Hazard Areas

The State of California Department of Forestry and Fire Protection (CAL FIRE) is required by law to periodically map areas of significant fire hazards based on history, fuels, terrain, weather, and other relevant factors that influence fire potential and behavior. The fire hazard areas are delineated into zones known as Fire Hazard Severity Zones (FHSZ) that influence the construction of buildings and property protection to reduce the risks associated with wildland fires. In addition to areas of state responsibility, the map also displays areas where local governments have financial responsibility for wildland fire protection depicting moderate, high and very high delineations.

The Corona Fire Department collaborated with CAL FIRE in the development of our local Fire Hazard Severity Zone map. The Fire Chief approved the map on May 1, 2010, and it was adopted by the Corona City Council on May 19, 2010. See Figure 4.2.2 – Fire Hazard Zones.

The Fire Hazard Severity Zone Map will be used for:

- Implementing wildland-urban interface building standards for new construction using the 2007 California Building Code, Section 7A (Wildland-Urban Interface);
- Natural hazard real estate disclosure at the time of sale;
- One-hundred foot defensible space clearance requirements around buildings;
- Property development standards such as road widths, water supply and signage;
- Reference for City and County General Plans.

3. Electrical Failure

Corona's electric utility was established on April 4, 2001, by City Council Resolution No. 2001-25 in response to state-wide rolling blackouts and electric price instability. The electric utility provides fully bundled electric service to City owned and operated facilities and eight areas within the City. It also provides energy delivery services to municipal and commercial customers within the City.

Corona's electric utility was established on April 4, 2001, by City Council Resolution No. 2001-25 in response to state-wide rolling blackouts and electric price instability. The electric utility provides fully bundled electric service to City owned and operated facilities and eight areas within the City. It also provides energy delivery services to municipal and commercial customers within the City.

The current lack of back-up electricity at the City's well sites leaves the City and its residents vulnerable to water service interruptions in the event of an electrical power failure. The Corona Department of Water and Power is responsible for the provision of water to more than 40,000 service connections. Currently, approximately half of the City's water is imported (via the Metropolitan Water District) and the other half is produced via local groundwater wells. Many of the City's groundwater wells do not have back-up generator power. This critical water source has great potential to be compromised by a power failure. A lack of pumping capability could interrupt water supply and delivery to thousands of residents. A power failure could deeply affect water supplies to residents, hospitals and other essential facilities. The loss of potable water is one of the most devastating effects from a natural disaster and can have long-term and lethal impact. The lack of drinking water quickly leads to water-borne illness and dehydration and these conditions disproportionately affect the elderly, young and infirm.

The City's above ground power lines are susceptible to the high winds that pass through the City. The potential for arcing lines causing sparks to drop onto buildings or brush is a hazard that the utility department continues to address, however there have been few major fires caused by this type of event. In addition to the overhead lines, there is a potential for events relating to underground vaults and power lines. These vaults and lines are susceptible to flooding during heavy rains as well as being broken by contractors digging in the streets and on property where underground utilities are used. (See Riverside County OA MJHMP Section 4.0)

4. Terrorist Event

Terrorism, as defined by the FBI, is "the unlawful use of force against persons or property to intimidate or coerce a government, the civilian population or any segment thereof, in the furtherance of political or social objectives. The tactics of terrorism are diverse. As important as the actual attacks is the cultivation in the target population of the fear of such attacks, so that the threat of violence becomes as effective as actual violence. Terrorist tactics tend to favor attacks that avoid effective countermeasures and exploit vulnerabilities. As such, terrorists have the potential to utilize many different types of tactics both conventional and unconventional. Some of these tactics include shootings, kidnappings, bombings, suicide attacks, bioterrorism, agro terrorism, nuclear terrorism, and cyberterrorism. From 2010 to 2016 there have been roughly 40 confirmed domestic terrorist incidents (See Riverside County OA MJHMP Section 4.0)

5. Water Supply Disruption/Contamination

The Corona Department of Water and Power is responsible for the provision of water, serving approximately 150,000 customers. Currently, approximately half of the City's water is imported (via the Metropolitan Water District) and the other half is produced via local groundwater wells. A majority of the City's groundwater wells do not have back-up generator power. This critical water source has great potential to be compromised by a power failure. A lack of pumping capability could interrupt water supply and delivery to thousands of residents. A power failure could deeply affect water supplies to residents, hospitals and other essential facilities. The loss of potable water is one of the most devastating effects from a natural disaster and can have long-term and lethal impact. The lack of drinking water quickly leads to water-borne illness and dehydration and these conditions disproportionately affect the elderly, young and infirm.

In addition, water reservoir failure could critically impair the City's fire fighting capabilities. The Corona Fire Department currently uses potable water for fighting fires. Plans are in place for the recycled water to be utilized as new infrastructure is constructed and more water is treated for recycled use. However, city-wide availability of recycled water for firefighting is several years away.

On June 4, 2008, the Governor of the State of California proclaimed a condition of statewide drought and strongly encouraged local agencies to take aggressive, immediate action to reduce water consumption and prepare for potentially worsening conditions. Once again, conditions worsened and on January 17, 2014 California State Governor, Jerry Brown, declared a drought state of emergency. On April 17, 2017, Brown issued Executive Order B-40-17, officially ending the drought state of emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne. During these times the City of Corona adopted, implemented and enforced water conservation programs to reduce the quantity of water used by consumers within the City to ensure that there was sufficient water for human consumption, sanitation, and fire protection. The City was diligent in conserving water, resulting in a nearly 20% reduction in Corona over the declared drought period. The City is authorized to declare a water shortage emergency to prevail within its jurisdiction when it finds and determines that the City will not be able to or cannot satisfy the ordinary demands and requirements of water consumers without depleting the water supply of the City to the extent that there would be insufficient water for human consumption, sanitation, and fire protection.

6. Flood

Several creeks, washes, channels, and flood zones are contained in the Planning area of Corona. Areas of the City adjacent to the Santa Ana River, Temescal Creek and Mabey Canyon Wash are designated as Flood Zone A, which indicates the area is inundated by one percent annual chance flooding. Portions of the Planning Area surrounding the Temescal Wash, Main Street Wash, and the Arlington Channel have been designated as Flood Zone X500, which is inundated by 0.2 percent annual chance flooding. Other portions of the Planning Area are either designated as Flood Zone D, which is an area with undetermined possible flood hazards, or Flood Zone X, which lies outside the one percent and 0.2 percent annual chance flood plains. See Figure 4.7.2 – Flood Zones.

Several creeks, washes, channels, and flood zones are contained in the Planning area of Corona. Areas of the City adjacent to the Santa Ana River, Temescal Creek and Mabey Canyon Wash are designated as Flood Zone A, which indicates the area is inundated by one percent annual chance flooding. Portions of the Planning Area surrounding the Temescal Wash, Main Street Wash, and the Arlington Channel have been designated as Flood Zone X500, which is inundated by 0.2 percent annual chance flooding. Other portions of the Planning Area are either designated as Flood Zone D, which is an area with undetermined possible flood hazards, or Flood Zone X, which lies outside the one percent and 0.2 percent annual chance flood plains. See Figure 4.7.2 – Flood Zones.

Temescal Wash has the highest flooding potential in the Corona Planning Area. Due to the size of the Temescal Watershed and the amount of rainfall received, several peak discharges have been recorded. Based on the stream gauge analysis data obtained from Flood Insurance Study dated September 30, 1992, the peak discharges for the 500-year, 100-year, and 10-year are 110,000 cfs (cubic feet per second), 25,000 cfs, 11,000 cfs, and 2,000cfs, respectively, for the 164-square mile watershed. These discharges are obtained from the Flood Insurance Study Report for the Stream Gauge No. 11-720 near Corona above the 3M plant location. The peak discharges are determined from the stream gauge data analysis, which is based on clear flow and existing conditions.

The Planning Area has experienced major flooding during periods of heavy runoff. The 1969 flooding in Temescal Wash caused extensive damage, which was determined to be higher than 100-year storm levels. Major flooding in the Planning Area could occur along the Temescal Wash and in west Corona, and storm sheet flows would produce a variety of damage depending upon the location. This sheet flow would be the result of overflows from the Oak Street Channel, Lincoln Avenue drain, Main Street Channel, Buena Vista drain, and Taylor Avenue drain. Other significant flooding areas are found along the open channel facilities near the City Yard. These facilities are determined to be inadequate for the 2-year storm event.
Several flood control projects including the Main Street Channel and Arlington Channel have been built in the Planning Area to help lessen the severity of heavy flooding.

The City of Corona participates in the National Flood Insurance Program (NFIP), as administered through the Federal Emergency Management Agency (FEMA). Consequently, property owners are able to purchase Federal Flood Insurance. In turn, the City of Corona has identified flood hazard areas and protective controls, including land use planning measures to reduce the potential risk of flood damage to property and loss of human life. (See Riverside County OA MJHMP Section 4.0)

7. Emergent Disease/Contamination

Infectious diseases have for centuries ranked with wars and famine as major challenges to human progress and survival. They remain among the leading causes of death and disability worldwide. Against a constant background of established infections, epidemics of new and old infectious diseases periodically emerge, greatly magnifying the global burden of infections. Studies of these emerging infections reveal the evolutionary properties of pathogenic microorganisms and the dynamic relationships between microorganisms, their hosts and the environment.

Climate change may well be the pre-eminent challenge of our time and it is already having a significant and measurable impact on California's environment.

Climatic factors influence the emergence and reemergence of infectious diseases, in addition to multiple human, biological, and ecological determinants. Climatologists have identified upward trends in global temperatures and now estimate an unprecedented rise of 2.0°C by the year 2100. Of major concern is that these changes can affect the introduction and dissemination of many serious infectious diseases.

The incidence of mosquito-borne diseases, including malaria, dengue, and viral encephalitides, are among those diseases most sensitive to climate. Climate change would directly affect disease transmission by shifting the vector's geographic range and increasing reproductive and biting rates and by shortening the pathogen incubation period. Climate-related increases in sea surface temperature and sea level can lead to higher incidence of water-borne infectious and toxin-related illnesses, such as cholera and shellfish poisoning. Human migration and damage to health infrastructures from the projected increase in climate variability could indirectly contribute to disease transmission. Human susceptibility to infections might be further compounded by malnutrition due to climate stress on agriculture and potential alterations in the human immune system caused by increased flux of ultraviolet radiation.

8. Transportation Failure

The City of Corona's extensive transportation network which includes state highways, public transit, rail lines, and municipal airport provide additional associated incident risks that may cause severe injuries and/or deaths. Two major freeways and one railroad transect Corona. The Riverside Freeway (SR-91) runs east/west directly north of the City's center, Interstate 15 (I-15) runs north/south near the eastern edge of the City. Along with the potential for death and injuries from large-scale motor vehicle accidents, there is the potential for hazardous material spills or fires as numerous commercial transportation vehicles travel the highways and freeways with various types and quantities of hazardous materials.

The BNSF Railroad parallels SR-91, it is a strictly commercial freight transportation system. Large quantities and numerous types of hazardous materials are transported through Corona by rail on a daily basis. These corridors are major transportation routes to the economic center of Orange County from the Inland Empire. The primary hazard with rail service has not been any train vs. train or track derailments. There continues to be a large number of train v. vehicle or train v. pedestrian accidents in the City. These accidents have caused both traffic and rail service delays. The danger with these types of accidents is that they can create train derailments or accidents when the train impacts with a vehicle or when the train engineer attempts to stop the train quickly.

The Corona Municipal Airport is home to 350-400 general aviation aircraft and is strictly a recreational airport with no commercial flights. Although small, the airport is extremely active, with approximately 50,000 annual operations. The City's transportation network of roads, freeways, rail lines and airport has been a priority in the city's planning and mitigation efforts.

A Traffic Safety Plan has been implemented for the management of traffic events that occur in the City. Public Works, Police, Fire have identified routes through the city to mitigate traffic issues that might occur. Command Posts, staging areas and other aspects of Incident Command have been addressed in the Traffic Safety Plan.

9. Communication Failure

One of the most immediate and significant impacts of disasters is the sudden and wide-scale breakdown or interruption of communications infrastructure. When public communication networks fail, the impact can be widely felt and has the ability to wipe out access to standard mobile or landline telecommunications, in addition to Internet, fiber-optic cables, and even satellite-based emergency communication devices. Whether these systems are completely or just partially knocked offline, communications systems during a disaster can be the difference between life and death for those affected. Locating those who may be trapped or injured becomes nearly impossible for emergency responders, and rescue efforts are further complicated by the inability to coordinate via standard methods of communication.

In addition to disruptions caused by physical damage you will more than likely encounter network congestion. When disaster strikes, the “pipes” that make up our communications networks often become congested with exceptionally high levels of data traffic, as those impacted seek to contact family and friends, emergency personnel work to coordinate relief efforts, and hundreds more upload pictures and videos of the damage.

Aggregation hubs are often the failure point for congested networks. This occurs when data from a number of smaller sources flows into a central processing point and creates bottlenecks. When this happens, communications can be severely limited or even cut off completely.

Consequences from these communication infrastructure failures can greatly effect emergency response and lead to the spread of false information and confusion.

10. Pandemic Flu

An influenza pandemic is a global outbreak of a new influenza A virus. A novel influenza A virus is one that has caused human infection, but is different from current seasonal human influenza A viruses spreading among people. Novel influenza A viruses can be viruses that originate in animals that gain the ability to infect humans or human viruses that change significantly so as to be different from current human seasonal influenza A viruses. Some novel flu A viruses are believed to pose a greater pandemic threat than others and are more concerning to public health officials because they have caused serious human illness and death and also have been able to spread in a limited manner from person-to-person. Novel influenza A viruses are of extra concern because of the potential impact they could have on public health if they gained the ability to spread from person-to-person easily, triggering a pandemic.

Three subtypes of avian influenza A viruses H5, H7 and H9, along with variant viruses H1N1v, H3N2v and H1N2v are currently most concerning to public health officials. In September, 2009, the H1N1 influenza received worldwide attention as a threat to public health. Cases of death related to the H1N1 flu surfaced first in Riverside County, as the illness spread throughout the State as well as the Nation. The City of Corona was not exempt and had cases emerge at local schools. Conference calls with the County Health Officer, local government and school officials and emergency managers helped the City to prepare for the threat of a pandemic emergency.

Subsequently, the City of Corona took measures to mitigate and adopted a Plan for Pandemic emergencies. (See Riverside County OA MJHMP Section 4.0)

Figure 4.4.1 – Earthquake Fault Zones for City of Corona

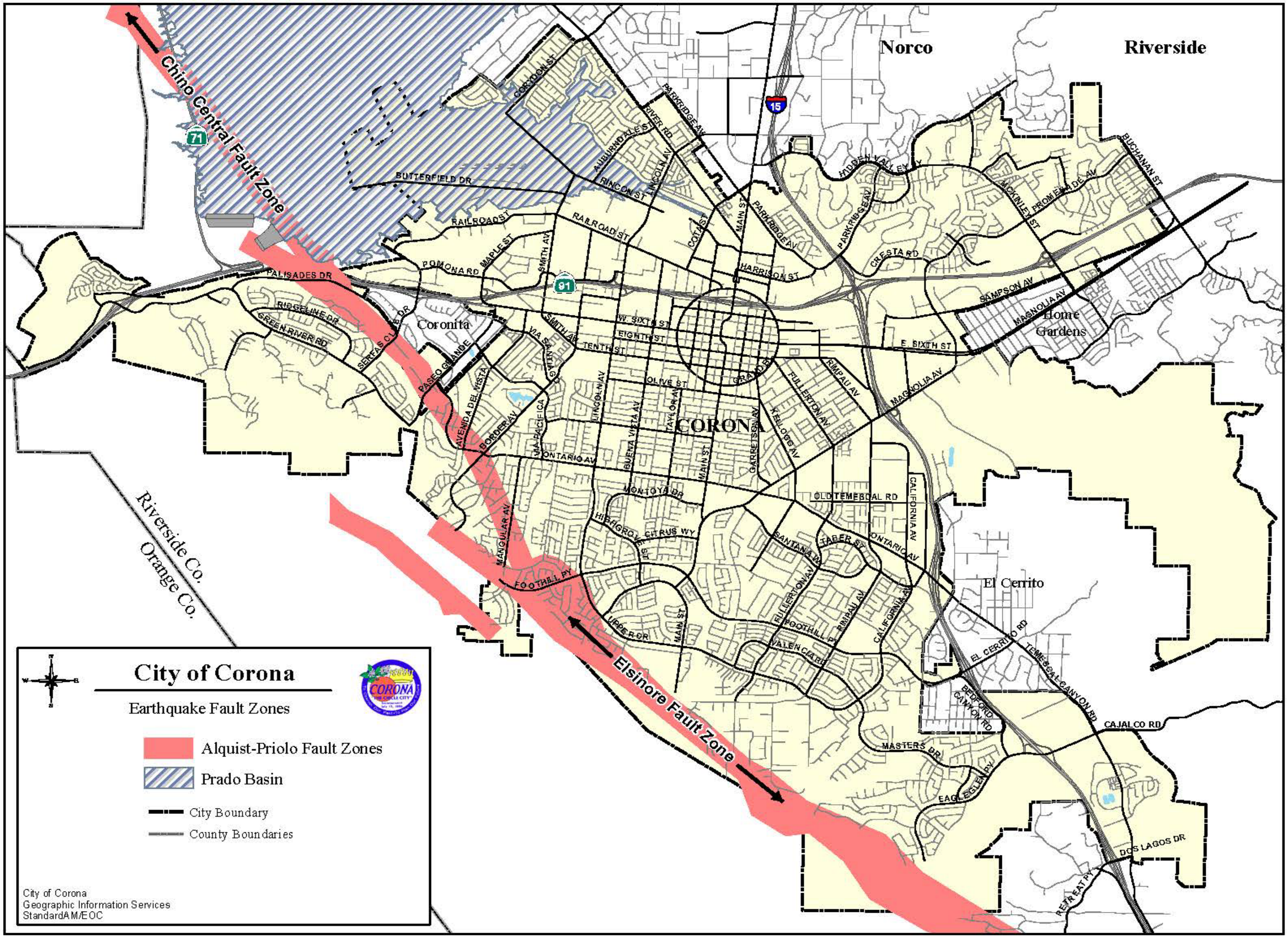


Figure 4.4.2 – Flood Zones for City of Corona

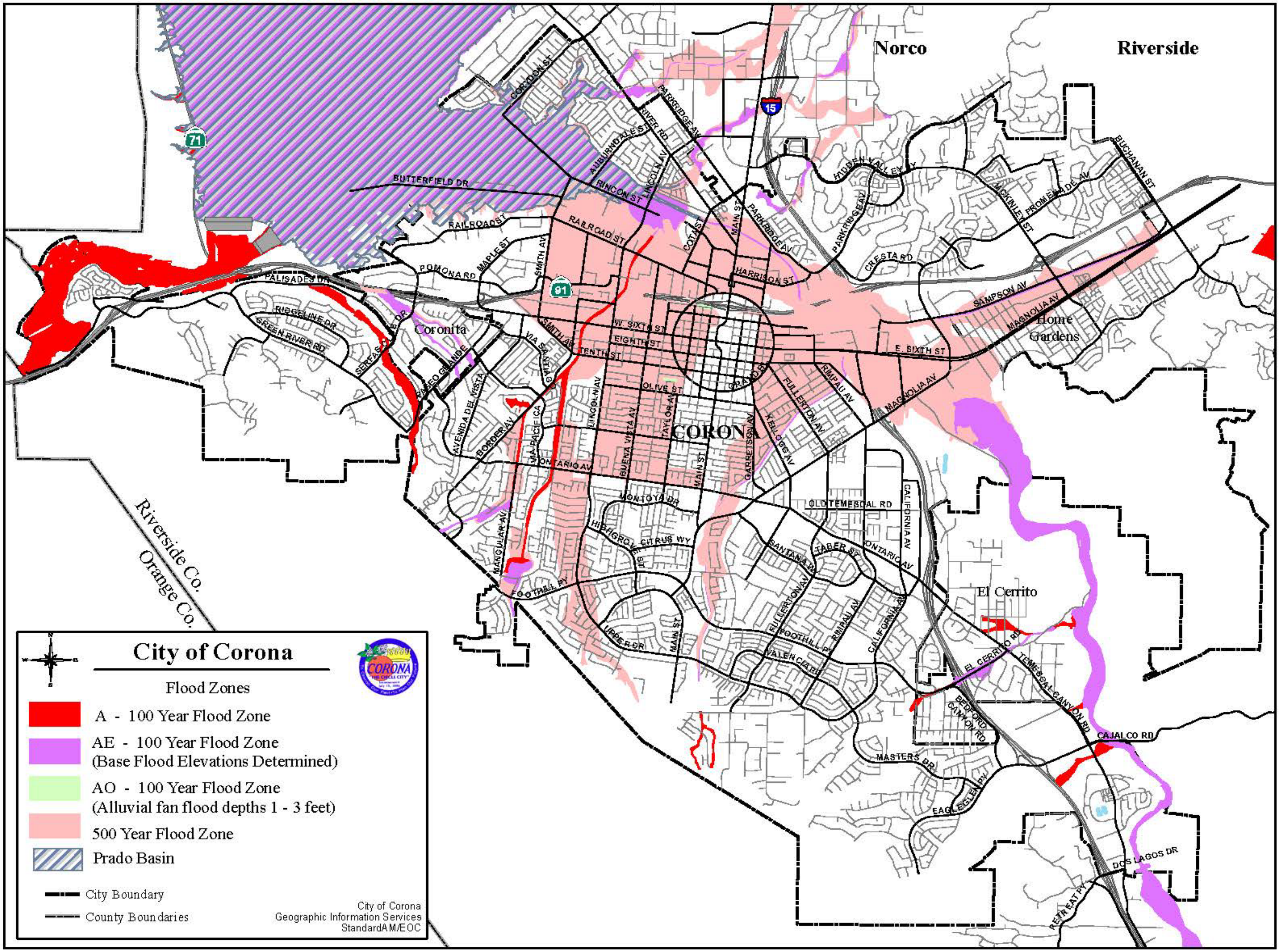
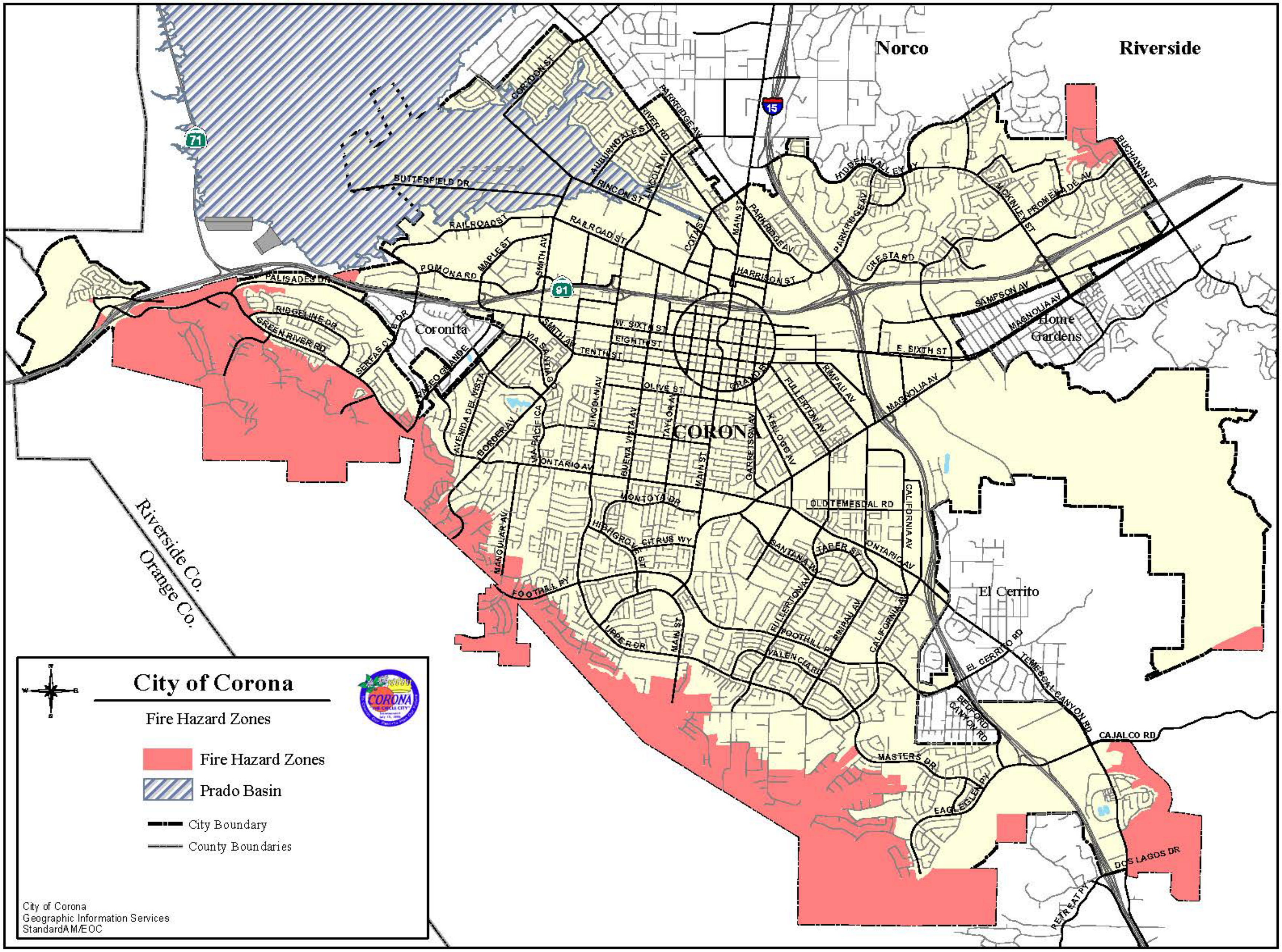


Figure 4.4.3 – Fire Hazard Zones for City of Corona



SECTION 5.0 – COMMUNITY RATING SYSTEM

5.1 REPETITIVE LOSS PROPERTIES

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements.

As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS:

1. Reduce flood losses;
2. Facilitate accurate insurance rating; and
3. Promote the awareness of flood insurance.

There are 29 repetitive loss properties in the City of Corona based on the information received at time of LHMP preparation with FIRM.

5.2 NATIONAL FLOOD INSURANCE PROPERTIES

The City of Corona has participated in the National Flood Insurance Program since 1978.

a. ***Describe participation in NFIP, including any changes since previously approved plan.*** Corona's recent activity related to NFIP includes updated Riverside County Flood Insurance Study and digitized Flood Insurance Rate Maps (FIRM) on August 28, 2008. City of Corona Floodplain Management Ordinance updated on December 3, 2008.

b. ***Date first joined NFIP*** - May 15, 1978

c. ***Identify actions related to continued compliance with NFIP*** – Corona Floodplain Management Ordinance was updated in 2008 to meet the minimum NFIP requirements pursuant to Title 44 Code of Federal Regulations Sections 59, 60.3-60.6, and 65.3 and the California Department of Water Resources (DWR) Model Ordinance. The Public Works Department reviews development permit applications and plans to ensure they are in compliance with our Ordinances and requires map revisions as necessary and maintains records such as elevation certificates, Letters of Map Changes, and Flood Insurance Rate Maps (FIRMs) for public availability. The Community Development Department and Public Works Department investigate violations and issue enforcement orders to bring developments in compliance with City Ordinances.

d. **CRS member** – No
e. **CRS class** – n/a
f. ***Describe any data used to regulate flood hazard area other than FEMA maps***- Riverside County Flood Insurance Study issued August 28, 2008; Drainage studies used to support CLOMR and LOMR issuance.
g. ***Have there been issues with community participation in the program?*** No
h. ***What are the general hurdles for effective implementation of the NFIP?*** Funding for updating outdated drainage studies and for performing new studies in previously unstudied flood hazard areas.
i. **Summarize actions related to continued compliance with NFIP** –See item c above.

Other Risks - There are no known risks that differ from the rest of the County planning area.

SECTION 6.0 - CAPABILITIES ASSESSMENT

The City's ability to reduce hazards by improving upon existing mitigation strategies or implementing newly identified mitigation strategies, include its legal and regulatory authorities, its administrative, technical, and fiscal capabilities, and imperative to the success of all these strategies, are its continuous outreach, education and partnership building capabilities.

6.1 REGULATORY MITIGATION CAPABILITIES

The City of Corona formally adopts, reviews and updates regulatory policies and plans, along with implementing regulations such as zoning and subdivision ordinances. The city partners and coordinates with Riverside County Operational Area to ensure we are apprised of all regional efforts and adhere to State and Federal mandates.

The hazard mitigation updating process provided the City with an opportunity to review, evaluate and expand on existing policies, plans and city programs. The updated LHMP data was provided to those involved in the current 2017/2018 updating of the General Plan, as well as the scheduled 2018/2019 updating of the Emergency Operations Plan (EOP) to ensure that consistency is maintained.

Figure 6.1.1 is an example of regulatory capabilities that assist the City of Corona in its mitigation strategies.

Figure 6.1.1 Regulatory Mitigation Capabilities for City of Corona

Regulatory Tool	Yes/No	Comments
General plan	Yes	Comprehensive General Plan for the City and SOI areas 2004, updating began 2017
Zoning ordinance	Yes	Corona Municipal Code (CMC) - Title 17
Subdivision ordinance	Yes	Corona Municipal Code - Title 16
Site plan review requirements	Yes	Development Plan Review CMC 17.102
Growth management ordinance	No	Included in Corona General Plan – Growth Development Plan
Floodplain ordinance	Yes	Corona Municipal Code Title 18
Other special purpose ordinance (storm water, water conservation, wildfire)	Yes	Water Conservation Ordinance, 2009; Chapter 13.26 of the Corona Municipal Code, Airport General Provisions Title 4 CMC, Fire Facilities Fee Chapter 3.36 CMC.
Building code	Yes	Green Buildings Code, CMC 15.05.010, Fuel Modification CMC 15.12.110, Eave Protection Chapter CMC 15.12.270.
Fire department ISO rating	Yes	Rating: Two
Erosion or sediment control program	Yes	CMC 15.36.80 (Ord. 2806 and 2568)
Storm water management program	Yes	CMC 13.27, Riverside County Drainage Area Management Plan (DAMP), Drainage Master Plan-Riverside County NPDES co-permittee
Capital Improvements Program	Yes	Five-year plan; updated annually.
Economic development plan	No	Team Corona, program for expansion, relocation or development of commercial projects since.
Local Emergency Operations Plan	Yes	Emergency Operations Plan, November 1999, replaced 2005, updated 2011 and 2015
Other special plans		• Water Master Plan, • Urban Water Management Plan • Corona DWP Standard Plans and Specifications for Sewer & Water • Wildland Urban Interface Strategic Pre Plan 2 • California Fire Code Chapter 49, 2010 • Hazardous Materials Area Plan, California Fire Code, • Certified Unified Program Agency, • Fire Mutual Aid Threat - S.O.L.A.R. Plan
Flood Insurance Study or other engineering study for streams	Yes	Riverside County Flood Insurance Study, which includes City of Corona streams

6.2 ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

The figure below gives an example of the personnel responsible for or contributing to activities related to mitigation for the City. Their expertise is used in hazard mitigation identification, planning and strategies, where information is shared across various city plans.

Figure 6.2.1 Administrative and Technical Mitigation Capabilities for Corona

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Community Development Director
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Public Works Director and Building Official/Community Development
Planner/engineer/scientist with an understanding of natural hazards	Yes	Public Works Director
Personnel skilled in GIS	Yes	IT – GIS Division
Full time building official	Yes	Building Official/Community Development
Floodplain manager	Yes	City Manager
Emergency manager	Yes	Fire Department/Emergency Services Coordinator
Grant writer	Yes	Fire/ Police and contract with outside consultant.
GIS Data—Land use	Yes	IT – GIS Division
GIS Data—Links to Assessor's data	Yes	IT – GIS Division
Warning systems/services	Yes	Automated emergency notification system.

6.3 FISCAL MITIGATION CAPABILITIES

The figure below identifies financial tools and resources the city could potentially use to help fund mitigation activities. In addition to these resources the city is in constant pursuit of State and Federal grant opportunities to augment our mitigation financial capabilities. See section 6.5 Funding Opportunities.

Figure 6.3.1 - Fiscal Mitigation Capabilities for City of Corona

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Depending on budget & grantor approval
Capital improvements project funding	Yes	Depending on available budget
Authority to levy taxes for specific purposes	Yes	With voter/city council approval
Fees for water, sewer, gas, or electric services	Yes	With voter/city council approval
Impact fees for new development	Yes	With city council approval
Incur debt through general obligation bonds	Yes	With voter/city council approval
Incur debt through special tax bonds	Yes	With voter/city council approval
Incur debt through private activities	No	With voter/city council approval
Withhold spending in hazard prone areas	n/a	With voter/city council approval

6.4 MITIGATION OUTREACH AND PARTNERSHIPS

The City of Corona has an active emergency preparedness, education and outreach program. Mitigation strategies are taught throughout the year at various community events, fairs, schools, businesses and other functions. The greatest outreach efforts are being conducted through our Corona CERT Program.

We coordinate with local profit, non-profit, volunteer, and special district entities, such as the school district, the hospital, and the American Red Cross in addition to our Operational Area partners and their volunteer organizations, to plan for and participant in all hazard joint training and exercises. The vast array of knowledge and resources these entities bring to the table greatly improve upon our emergency management capabilities.

An example of these coordinated planning and training efforts is our city's participation in the regional mass care and shelter planning as we incorporate planning for access and functional needs individuals. In addition, the city has designated cooling and warming centers to utilize during severe weather emergencies, when the establishment of a shelter is not necessary.

One of the most successful systems used to improve upon and augment our City's capabilities and resources is our participation and partnership in the various mutual aid systems. Our Police and Fire Departments participate in mutual aid agreements in the event the City's forces are stretched beyond their capabilities. California Emergency Management Agency coordinates the Emergency Management Assistance Act for the response of emergency management resources to assist in the management of emergencies and disasters. Our Corona Department of Water and Power participates in Cal WARN and the local ERNIE water resource mutual aid organizations. The City of Corona manages emergencies under the National Incident Management System (NIMS) which utilizes the Master Mutual Aid concept.

6.5 FUNDING OPPORTUNITIES

In addition to the fiscal capabilities identified in figure 6.3.1 – Fiscal Mitigation Capabilities for City of Corona, some of the greatest funding opportunities come in the form of State and Federal grants, such as the Hazard Mitigation Grant Program.

The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended (the Stafford Act), Title 42, United States Code (U.S.C.) 5170c. The key purpose of HMGP is to ensure that the opportunities to take critical mitigation measures to reduce the risk of loss of life and property from future disasters are not lost during the reconstruction process following a disaster. HMGP is available, when authorized under a Presidential major disaster declaration, in the areas of the State requested by the Governor. The amount of HMGP funding available to the Applicant is based upon the total Federal assistance to be provided by FEMA for disaster recovery under the Presidential major disaster declaration.

The City of Corona applies for various grants to augment our mitigation financial capabilities. Examples of successful grants awarded to the City to assist in our mitigation efforts are as follows.

1. The city applied for and received a grant award from the California Department of Water Resources (DWR) Flood Emergency Response

Projects – Statewide Grant Round Two. The grant provided funding for the city to prepare the Flood Emergency Response Plan, develop, and conduct a tabletop and functional training exercise to test the plan and prepare the city and other participating agencies for flood response (a flood in the city can be caused by both a storm event and dam failure). The plan development is underway with completion scheduled for December 2018.

2. The city applied for and was awarded Hazard Mitigation Grant Program #4653-307-01R funding for a hydro-seeding project in the burn scar of the 2017 Canyon Fire. The approved activity is to hydro-seed 200,000 square feet of fire damaged area behind a residential area bordering 48 homes and infrastructure using an endemic mixture of California Native Species. The re-establishment of ground cover will assist in the prevention of or lessening the effects of erosion, flash flooding and debris flow. This project will be completed by October 2018

SECTION 7.0 - MITIGATION STRATEGIES

7.1 GOALS AND OBJECTIVES

The City of Corona's updated 2017 mitigation goals and objectives pertinent to the 2017 hazard ranking are the following:

Goal 1: Reduce loss of life and injuries

Objective 1.1: Provide timely notification and direction to the public in preparation for and response to imminent and potential hazards.

Objective 1.2: Protect public health and safety through mitigation, preparing for, responding to, and recovering from the effects of natural, technological or man-made disasters.

Objective 1.3: Reduce hazard impacts and protect life, property and the environment from damages.

Goal 2: Reduce Hazard Related Property Losses

Objective 2.1: Encourage new development to occur in locations that avoid or minimize exposure to hazards.

Objective 2.2: Reduce hazard related property losses by enforcing strong building, fire, and municipal codes.

Objective 2.3: Reduce repetitive losses for fire, flood, and earthquakes by encouraging protective measures and by anticipating future events.

Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of mitigation strategies.

Objective 2.5: Continue to strengthen land use regulations in high hazard areas.

Goal 3: Protect the environment

Objective 3.1: Mitigate the impact of recurring drought conditions that impact both ground water supply and the agricultural industry.

Objective 3.2: Protect the environment from hazardous material releases or exposures.

Objective 3.3: Protect the environment from sewage, wastewater, and storm water pollution or contamination.

Goal 4: Improve coordination and collaboration with City Departments and partnering agencies throughout all phases of emergency management.

Objective 4.1: Coordinate with County EMD, Cal OES and FEMA to ensure SEMS/NIMS compliancy and to ensure any updates or changes are instituted.

Objective 4.2: Improve City's ability for continuity of operations for all hazard incidents.

Objective 4.3: Incorporate mitigation related activities into other disaster planning mechanisms, such as the General Plan and Capital Improvement Plan.

Objective 4.4: Participate in Operational Area meetings, committees, and exercises.

Goal 5: Improve Community and Agency Awareness

Objective 5.1: Improve mitigation and hazard related outreach to the general public, businesses and other stakeholders to increase their understanding of the various types, locations and effects of hazards and vulnerabilities, and actions they can take to reduce those hazard impacts.

Objective 5.2: Improve, standardize, and expand the emergency preparedness education and outreach program.

7.2 MITIGATION ACTIONS

The City of Corona identified the following mitigation actions to be taken based on the Goals and Objectives established, pertinent to the hazard ranking assessment. These actions are in addition to the on-going mitigation strategies identified in Section 7.3 and the projects to be completed in the comprehensive Five Year Capital Improvement Program (CIP), which provides for the maintenance and improvement of the City's infrastructure. Infrastructure includes such items as: streets, alleyways, sidewalks, sewers, storm drains, water system, street lighting, and traffic signals. For a listing of scheduled Capital Improvement Projects visit http://www.discovercorona.com/City-Departments/Finance/Operating-and-Capital-Improvement-Budgets.aspx.

The following mitigation projects have been identified by the responsible city department, scheduled and a funding mechanism has been allocated.

1) **Goal 4**: Improve coordination and collaboration with City Departments and partnering agencies throughout all phases of emergency management.

   Objective 4.2: Improve City's ability for continuity of operations for all hazard incidents.
   Action: Enhance communication interoperability by purchasing Harris Unity Radios; these radios will operate on the Public Safety Enterprise Communications 10.

   Responsible Dept: Police Department
   Mitigated Hazard: Communications Failure
   Status: In progress and ongoing.
   Funding: FY 17 State Homeland Security Program

2) **Goal 1**: Reduce loss of life and injuries

   Objective 1.1: A Provide timely notification and direction to the public in preparation for and response to imminent and potential hazards.

   Action: Replace/upgrade current Computer Aided Dispatch system which has been in place for over 30 years.

   Responsible Dept: Police Department
   Mitigated Hazard: All
   Status: In progress will be completed July 2019.
   Funding: City General Fund

3) **Goal 3**: Protect the environment

   Objective 3.2: Protect the environment from hazardous material releases or exposures.

   Action: Update the Hazardous Materials Area Plan in coordination with Riverside County Environmental Health to assist in the prevention or mitigation of damage from the release or threatened release of hazardous materials.

   Responsible Dept: Fire Department
   Mitigated Hazard: HazMat, Fire

Status: Updates to the plan have been completed and it is with the State for review. The approved plan will be taken to Council for formal adoption by October 2018
Funding: City General Fund

4) **Goal 1**: Reduce loss of life and injuries

Objective 1.3: Reduce hazard impacts and protect life, property and the environment from damages.

Action: Conduct Active Shooter exercise for Tactical Response Team. Enter scene under force protection to provide care to victims that otherwise would have died from preventable death injuries.
Responsible Dept: Police and Fire Department
Mitigated Hazard: Terrorism
Status: Three-day quarterly exercises started in June 2017.
Funding: City General Fund

5) **Goal 2**: Reduce Hazard Related Property Losses

Objective 2.3: Reduce repetitive losses for fire, flood, and earthquakes by encouraging protective measures and by anticipating future events

Action: Department of Water and Power in conjunction with Emergency Management Division will facilitate the creation of a flood plan for the City of Corona

Responsible Dept: Department of Water and Power and Fire Department
Mitigated Hazard: Flood
Status: Plan development in progress, complete by December 2018
Funding: California Dept. of Water Resources – Flood Emergency Response Projects – Statewide Grant

6) **Goal 2**: Reduce Hazard Related Property Losses

Objective 2.3: Reduce repetitive losses for fire, flood, and earthquakes by encouraging protective measures and by anticipating future events.

Action: Design and construction of Corona MDP Line 52 to alleviate flooding on Grand Avenue and Joy Street

Responsible Dept: Department of Water and Power
Mitigated Hazard: Flood
Status: In progress will be complete November 2018
Funding: City General Fund – Capital Improvement Project

7) **Goal 2**: Reduce Hazard Related Property Losses

Objective 2.2: Reduce hazard related property losses by enforcing strong building, fire, and municipal codes.

Action: Three new housing developments are planned adjacent to high risk fire areas. Ensure new development is in compliance with Chapter 49 of the Fire Code. And a separate fuel modification plan to be submitted for review and approval by Fire Department

Responsible Dept: Fire Department/Prevention
Mitigated Hazard: Fire
Status: Initial development stages, developments will be complete by 2021
Funding: Permit and inspection fees

8) **Goal 5**: Improve Community and Agency Awareness

Objective 5.1: Improve mitigation and hazard related outreach to the general public, businesses and other stakeholders to increase their understanding of the various types, locations and effects of hazards and vulnerabilities, and actions they can take to reduce those hazard impacts.

Action: Provide Community Emergency Response Team training to the community. Offer this training twice a year.

Responsible Dept: Fire Department/Emergency Management Division
Mitigated Hazard: All
Status: Annual and ongoing.
Funding: State Homeland Security Program grant funding

9) **Goal 4**: Improve coordination and collaboration with City Departments and partnering agencies throughout all phases of emergency management.

Objective 4.3: Incorporate mitigation related activities into other disaster planning mechanisms, such as the General Plan and Capital Improvement Plan.

Action: Coordination with Caltrans, Riverside County Transportation Commission with the Corona Freeway Improvement Projects. These projects hope to reduce traffic, increase capacity and mobility.

- Interstate 15 corridor improvement project
- State Route 91 corridor improvement project
- State Route 91/SR-71 interchange improvement project

Responsible Dept: Public Works
Mitigated Hazard: Transportation Failure
Status: In progress all projects complete by 2020
Funding: Caltrans District 8

10) **Goal 4**: Improve coordination and collaboration with City Departments and partnering agencies throughout all phases of emergency management.

Objective 4.2: Improve City's ability for continuity of operations for all hazard incidents.

Action: Develop a multi-year EOC responder training and exercise plan, enhancing the city's ability to respond and recover from all hazard incidents, lessening the negative impacts to our residents.

Responsible Dept: Fire Department/Emergency Management Department
Mitigated Hazard: All
Status: In development complete and implemented by July 2018
Funding: City General Fund

7.3 ON-GOING MITIGATION STRATEGY PROGRAMS

The City of Corona has implemented and or updated several policies, procedures, programs and plans in an effort to lessen the impact of disasters and prevent the loss of life and property. Some of these on-going mitigation efforts are identified in the table below.

Figure 7.3.1 On-Going Mitigation Strategy Programs

Hazard Type	Mitigation Action	Mitigation Strategy
All	2017 LHMP Update and annual review	Update 2012 Local Hazard Mitigation Plan to identify projects to lesson the impact of disasters and prevent the loss of life and property. Review to ensure priorities are not changed.
Contamination, Pollution, Flood	Storm Water and Urban Runoff Pollution Prevention Program	Prevents pollution of local waterways, regulates what can be discharged into storm drains.
Terrorism	BioWatch Program Participant	BioWatch provides early detection of biological agents in the air used for a bioterrorism attack.
Transportation Failure, Terrorism	Traffic Management Center	Single location to monitor throughout the City over 70 traffic signals, 15 monitoring cameras and a video and data link between CalTrans District 8 TMC in San Bernardino.
Transportation Failure	Advanced Traffic Management System	Ability to make adjustments to timing of traffic signal systems on local streets and bottom of freeway ramps to assist in moderating congestion.
Terrorism	Train and Exercise PD & Fire Tactical Response Team	Enter scene under force protection to provide care to victims that otherwise would have died from preventable death injuries.
HazMat, Transportation Failure, Fire	Hazardous Material Area Plan	Hazardous Material Area Plan, assists in the prevention or mitigation of damage from the release or threatened release of hazardous materials.
Pandemic Flu	Pandemic Influenza Plan	City of Corona Pandemic Influenza Plan facilitates coordination with County Public Health for an organized and quick response to a pandemic effecting the City, lessening the
Fire, Transportation Failure, Terrorism	Emergency Airport Plan	Corona Municipal Airport Emergency Plan, provides agency coordination, communication procedures and lines of authority.
Flood/Water Supply Contamination	Sewer System Management Plan	Sewer System Management Plan, outlines preventative maintenance, schedule of maintenance and response plan.
Water Supply Disruption/ Drought	Urban Water Management Plan	Urban Water Management Plan - conservation and efficient water use
Climate Change/Drought, Emergent Disease	Climate Action Plan	Climate Action Plan - identifies and implements actions to reduce GHG emissions.
Fire	Suppression Inspection Action Plan	Suppression Inspection Action Plan - facilitates the completion of hazard reduction inspections.
HazMat, Fire	G&G Environmental Contract	Conduct on-site inspections for businesses housing hazardous materials to ensure compliance of State, County and local policies and procedures.
Communications Failure/Fire	SOLAR/Multi - County Mutual Threat Zone Guide	Continued participation with the SOLAR group in contingency planning for communications, resources and response to mutual threat areas.
All	Fire & PD Annual Master Training Plan	Improves the safety and performance of Department's members in order for them to prevent or minimize loss of life, damage to the environment and loss of property.

7.4

Hazard Type	Mitigation Action	Mitigation Strategy
Fire	Wildland Urban Interface Strategic Pre Plan	Pre planning lends to an organized multi-agency response to wildland urban interface fires reducing loss of life, injuries and property.
All	Emergency Notification System	Provide timely notification and direction to the public in preparation for imminent and potential hazards, to reduce loss of life, injuries, and property.
Transportation Failure	Traffic Incident Plan	Addresses long term freeway closures, to provide coordinated Unified Command, public information, rapid notification, stranded motorists needs, to better provide for public safety
All	Enforcement of strong building, fire, and municipal codes	Reduce hazard related property losses
All	Emergency Services Quality Improvement Program	Corona Fire Department Emergency Medical Services Quality Improvement Program - delivery of consistent, high quality, compassionate pre-hospital patient care.
All	Emergency Medical Dispatch Program	Emergency Medical Dispatch Program - delivery of pre arrival medical direction

7.4 FUTURE MITIGATION STRATEGIES

The below are identified mitigation strategies. A funding source has either not yet been identified for these projects or the project is only partially funded. The City of Corona is continuously looking for funding opportunities to augment its financial mitigation capabilities.

For example, the city has submitted 2 Notice of Intents in the hopes of being successful recipients of Hazard Mitigation Grant funds, as a result of FEMA-4305-DR. If we are not successful in our efforts we will continue to pursue available funding opportunities and will utilize, when available, financial resources identified in 6.3 Fiscal Mitigation Capabilities. If funding can be secured we will move forward with the following projects.

1) **Goal 2**: Reduce Hazard Related Property Losses

    Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of mitigation strategies.

    Action: Purchase and install back-up generators at City's groundwater wells and blend station

    Responsible Dept: Department of Water and Power
    Mitigated Hazard: Electrical Failure, Water Supply Disruption, Earthquake
    Status: Not started

Funding: Submitted Notice of Intent for Hazard Mitigation Grant Funds

2) **Goal 2**: Reduce Hazard Related Property Losses

   Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of mitigation strategies.

   Action: Ensure four of the city's oldest fire stations with ages ranging from 30 to 50 years of service can withstand a significant seismic event.

   Responsible Dept: Fire Department
   Mitigated Hazard: Earthquake
   Status: Not started
   Funding: Submitted Notice of Intent for Hazard Mitigation Grant Funds

3) **Goal 2**: Reduce Hazard Related Property Losses

   Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of mitigation strategies.

   Action: Conduct maintenance identified in the Caltrans bridge inspection reports. The passing of SB 1 will provide the City funding for repairs to roads and bridges. Allocation of funds and priorities of projects have not yet been determined.

   Responsible Dept: Public Works
   Mitigated Hazard: Transportation Failure, Earthquake
   Status: TBD
   Funding: Senate Bill 1 funds not yet allocated

4) **Goal 2**: Reduce Hazard Related Property Losses

   Objective 2.4: Reduce hazard impacts to critical facilities, utilities and services through the implementation of mitigation strategies.

   Action: Conduct inspections of older water treatment facilities to ensure the ability to handle a seismic event and address any deficiencies.

   Responsible Dept: Department of Water of Power
   Mitigated Hazard: Earthquake, Water Supply Disruption/Contamination
   Status: TBD

Funding: Not yet determined

For a listing of all unfunded Capital Improvement Projects visit: http://www.discovercorona.com/City-Departments/Finance/Operating-and-Capital-Improvement-Budgets.aspx

SECTION 8.0 – PLAN IMPLEMENTATION AND MAINTENANCE PROCESS

The City of Corona will monitor and evaluate our LHMP on a yearly basis over the next 5 years and will make updates accordingly. We will review the LHMP and assess:

- The goals and objectives and address current and expected conditions.
- If the nature, magnitude, and/or type of risks have changed
- Current resources for implementing the plan and explore new resources.
- Implementation problems, such as technical, political, legal, or coordination issues with other agencies.
- The outcomes to ensure they are in line with the expected outcome, if not we will modify plan.
- Changes in Federal, State or local ordinances, laws and regulations
- Involve public by posting notices on websites and announcements during public meetings intent to review and update Local Hazard Mitigation Plan allowing for public comment and input.

If we discover changes have occurred during the evaluation, we will update the LHMP Revision Page, and notify Riverside County EMD to update our Annex.

The Fire Department Emergency Services Division will coordinate the monitoring, evaluation and update of the LHMP.

The City has incorporated the Local Hazard Mitigation Plan by adoption into the Safety Element of the City's General Plan.

SECTION 9.0 – INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City has incorporated the Local Hazard Mitigation Plan by adoption into the Safety Element of the City's General Plan. The Safety Element includes discussion of fire, earthquake, flooding, and landslide hazards. Based on the ranking of hazards identified in the LHMP priority of mitigation projects to address these hazards will be determined and used in the development of the City's Capital Improvement Plan.

In addition, the City has often developed plans, policies and adopted ordinance to assist in the mitigation of hazards identified in the LHMP. These mitigation efforts can be seen in the following figures:
See Figure 3.5.1 Mitigation Project Updates
See Figure 6.1.1 Regulatory Mitigation Capabilities
See Figure 7.3.1 On-Going Mitigation Strategy Programs

SECTION 10.0 - CONTINUED PUBLIC INVOLVEMENT

If any changes are made in the Scheduled Plan Maintenance Process, the public will be notified through actions taken at City Council meetings by posting of the Agenda, cable TV viewing of these meetings, posting on the City's website and outreach at community meetings.

APPENDIX A – PUBLIC NOTICES AND MAPS

RIVERSIDE COUNTY
QUARTERLY OPERATIONAL AREA PLANNING COMMITTEE
(OAPC)

October 13, 2016
9:00 a.m. – 11:00 a.m.
Beaumont City Hall, 550 East 6th St., Beaumont, CA 92223

AGENDA

I) Pledge of Allegiance, Welcome & Opening Remarks
Kim Saruwatari, Director, Riverside County Emergency Management Department (EMD)

II) Introductions

III) Approval of Minutes
OAPC Meeting Minutes of July 14, 2016

IV) New Business
1. Designation of the OAPC Vice-Chair
2. Designation of the Emergency Management representatives to serve on the Anti-Terrorism Approval Authority (ATAA) Board

V) Presentation
a) "ESRI - Emergency Management Tools". Justin Fan, Solutions Engineer for the Environmental Standards and Research Institute (ESRI), will provide an overview of available emergency management tools such as situational awareness dashboards, story maps, etc.

b) "Natural Gas Safety for Emergency Responders". Lea Peterson, Southern California Gas Company, will share information about the Gas Company's emergency incident response and safety procedures in and around natural gas pipelines.

VI) Standing Items
1. California Operational Area Coalition (COAC) Update
2. Standardized Emergency Management System (SEMS) / National Incident Management System (NIMS) Update / NIMSCAST
3. Grant Updates & Status Reports
4. Sub-Committees/Task Forces
   a. Training and Exercise
   b. Communications
5. Community Emergency Response Training (CERT) Program Managers' Update
6. VOAD – Volunteer Organizations Active in Disasters
7. CalOES Update
8. Local Hazard Mitigation Plan (LHMP) Update

VII. Roundtable & Public Comment

VIII. Next Quarterly OAPC Meeting ……………………………………………...….Thursday, January 12, 2017
Next Riverside County Disaster Council Meeting…………………………..Thursday, January 12, 2017

IX. Adjournment

RIVERSIDE COUNTY
ANNUAL DISASTER COUNCIL and
QUARTERLY OPERATIONAL AREA PLANNING COMMITTEE
(OAPC)

April 5, 2017
10:00 a.m. to 12:00 p.m.
Beaumont City Hall, 550 East 6th St., Beaumont, CA 92223

AGENDA

I) Pledge of Allegiance, Welcome & Opening Remarks
John Tavaglione, Chair, Riverside County Board of Supervisors and Riverside County Disaster Council
Kim Saruwatari, Director, Riverside County Emergency Management Department

II) Introductions

III) Approval of Minutes
Disaster Council meeting minutes of January 14, 2016..ATTACHMENT I
OAPC meeting minutes of January 12, 2017..ATTACHMENT II

IV) New Business
Presentation of Awards

V) Presentations

a) Emergency Preparedness and Response from a Large Urban School District Perspective, Jill Barnes, Ed.D, CEM, Coordinator, Office of Emergency Services, Division of District Operations, Los Angeles Unified School District (LAUSD).

b) Experience and Lessons-Learned from the February 2017 Oroville Dam Incident, Chief Justin McGough, CalFire/Riverside County Fire Department.

V) Standing Items

1. California Operational Area Coalition (COAC) Update
2. Standardized Emergency Management System (SEMS) / National Incident Management System (NIMS) Update / NIMSCAST
3. Grant Updates & Status Reports
4. Sub-Committees/Task Forces
   a. Training and Exercise
   b. Communications
5. Community Emergency Response Training (CERT) Program Managers' Update
6. VOAD – Volunteer Organizations Active in Disasters
7. CalOES Update
8. Local Hazard Mitigation Plan (LHMP) Update

VI. Roundtable & Public Comment

VII. Next Annual Disaster Council Meeting..Thursday, January 11, 2018
Next Quarterly OAPC Meeting ....Thursday, July 13, 2017

VIII. Adjournment

RIVERSIDE COUNTY
QUARTERLY OPERATIONAL AREA PLANNING COMMITTEE
(OAPC)

January 12, 2017
9:00 a.m. – 11:00 a.m.
Beaumont City Hall, 550 East 6th St., Beaumont, CA 92223

AGENDA

I) **Pledge of Allegiance, Welcome & Opening Remarks**
Kim Saruwatari, Director, Riverside County Emergency Management Department

II) **Introductions**

III) **Approval of Minutes**
OAPC Meeting Minutes of October 13, 2016

IV) **New Business**
Designation of the OAPC Vice-Chair for 2017
OAPC Appointment of Designee Form

V) **Presentation**
Crisis Communications and Media Response Training for Today's Leaders. Richard Brundage, President, Center for Advanced Media Studies.

V) **Standing Items**
1. California Operational Area Coalition (COAC) Update
2. Standardized Emergency Management System (SEMS) / National Incident Management System (NIMS) Update / NIMSCAST
3. Grant Updates & Status Reports
4. Sub-Committees/Task Forces
    a. Training and Exercise
    b. Communications
5. Community Emergency Response Training (CERT) Program Managers' Update
6. VOAD – Volunteer Organizations Active in Disasters
7. CalOES Update
8. Local Hazard Mitigation Plan (LHMP) Update

VI. **Roundtable & Public Comment**

VII. **Next Annual Disaster Council Meeting**...Date in April to be determined
Next Quarterly OAPC Meeting ....Date in April to be determined

VIII. **Adjournment**

April 3-4, 2017 - Mitigation Planning for Local and Tribal Communities

This course provides plan developers with the information necessary to prepare and implement a local Hazard Mitigation Plan. Objectives: Define hazard mitigation planning and identify the benefits of mitigation planning Develop or update a local mitigation plan Identify resources and guidance available for mitigation plan

Monday, April 3, 2017 at 8:00 AM PDT
-to-
Tuesday, April 4, 2017 at 5:00 PM PDT

C-1/Ben Clark Training Center
16902 Bundy Ave
Riverside, CA 92518

Thank you again for registering for our event. This email is confirmation of your successful registration. If any of the information displayed below is incorrect, please contact us as soon as possible.

Personal Information

First Name:	Gina
Last Name:	Moran-McGough
Email Address:	gina.moran-mcgough@ci.corona.ca.us

Contact
County of Riverside Emergency Mgt Dept.
County of Riverside Emergency Management Department
951-358-7100
sbjensen@rivco.org

Add to Calendar

This email was sent to gina.moran-mcgough@ci.corona.ca.us by sbjensen@rivco.org because you registered for April 3-4, 2017 - Mitigation Planning for Local and Tribal Communities.
Click here if you no longer wish to receive emails about this event.

County of Riverside Emergency Management Department | 4210 Riverwalk Pkwy Suite 300 | Riverside | California | 92505

Kim Saruwatari, MPH
Director

City LHMP Workshop

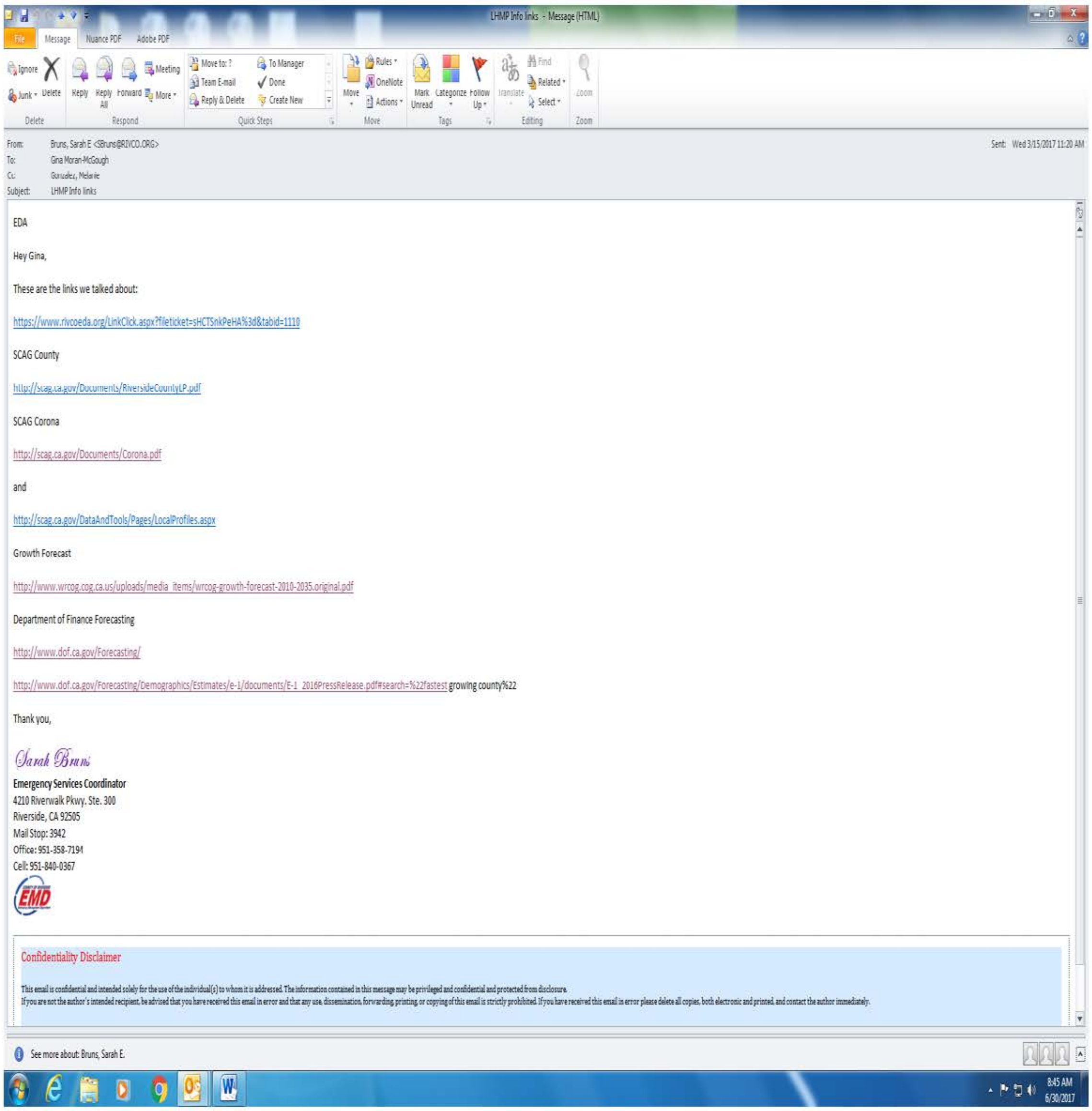
AGENDA

Tuesday June 6, 2017
9:00 a.m. – 10:00 a.m.

Subject	Time	Presented By	Purpose
I. Welcome and Introductions	5 Min.	Sarah Bruns	Inform
II. Hazard Mitigation Grant Program (HMGP)	10 Min.	Sarah Bruns	Inform/Discuss/ Handout
III. Region IX Review Guide	15 Min.	Sarah Bruns	Inform/Handout
IV. County Plan Update	5 Min.	Sarah Bruns	Inform
V. Next Steps • LHMP Submission & Review Process	10 Min.	Sarah Bruns	Inform
VI. Roundtable	10 Min.	All	
VII. Adjournment	5 Min.	Sarah Bruns	

4210 RIVERWALK PARKWAY, SUITE 300
RIVERSIDE, CALIFORNIA 92505
T: 951.358.7100 ♦ F: 951.358.7105 ♦ WEB: WWW.RIVCOREADY.ORG

County assistance given to City of Corona 3/15/17



LHMP Info links - Message (HTML)

From: Bruns, Sarah E <SBruns@RIVCO.ORG>

To: Gina Moran-McGough

Cc: Gonzalez, Melanie

Subject: LHMP Info links

Sent: Wed 3/15/2017 11:20 AM

EDA

Hey Gina,

These are the links we talked about:

https://www.rivcoeda.org/LinkClick.aspx?fileticket=sHCTSnkPeHA%3d&tabid=1110

SCAG County

http://scag.ca.gov/Documents/RiversideCountyLP.pdf

SCAG Corona

http://scag.ca.gov/Documents/Corona.pdf

and

http://scag.ca.gov/DataAndTools/Pages/LocalProfiles.aspx

Growth Forecast

http://www.wrcog.cog.ca.us/uploads/media_items/wrcog-growth-forecast-2010-2035.original.pdf

Department of Finance Forecasting

http://www.dof.ca.gov/Forecasting/

http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-1/documents/E-1_2016PressRelease.pdf#search=%22fastest growing county%22

Thank you,

Sarah Bruns

Emergency Services Coordinator
4210 Riverwalk Pkwy. Ste. 300
Riverside, CA 92505
Mail Stop: 3942
Office: 951-358-7194
Cell: 951-840-0367

EMD

Confidentiality Disclaimer

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See more about: Bruns, Sarah E.

8:45 AM
6/30/2017

From: Gonzalez, Melanie
To: Gina Moran-McGough
Subject: RE: LHMP
Date: Tuesday, April 11, 2017 3:11:48 PM
Attachments: 2017 Hazard Ranking.docx
Final Risk Scores.xlsx

Of course! I attached the 2017 county hazards and the risk scores that we gave to each of these county hazards, in regards to their severity and probability. I hope this helps to complete that specific page on the inventory worksheet. If not, please feel free to contact me and I can further assist you on what you may need. Thank you!

Melanie Gonzalez
Health Education Assistant II
Emergency Management Department
4210 Riverwalk Pkwy, Suite 300
Riverside CA.92505
Mail Stop: 3942
Direct Line: 951-955-5505
Work Cell: 951-476-4009
Main Department Line: 951-358-7100
Email: Melanie.Gonzalez@rivco.org

From: Gina Moran-McGough [mailto:Gina.Moran-McGough@ci.corona.ca.us]
Sent: Tuesday, April 11, 2017 2:58 PM
To: Gonzalez, Melanie <Melanie.Gonzalez@RIVCO.ORG>
Subject: LHMP

Hello Melanie,

I am conducting meetings with my City Departments and am reviewing the hazard rankings. In the Inventory worksheet that was included in the CD, the VULNERABILITY WORKSHEET is the one from 2012 which is missing some of the hazards identified in the 2017. Do you have the latest and greatest that you could possibly send me?? PLEASE☺

Thank you,

Gina Moran-McGough
Emergency Services Coordinator
Corona Fire Department – Emergency Services Division
(951) 736-2458

From: Gonzalez, Melanie
To: Gina Moran-McGough
Subject: LHMP Information
Date: Wednesday, March 15, 2017 11:32:13 AM
Attachments: 2017 Hazard Ranking.docx

Good Afternoon!

Training

EMD is in the process of bringing FEMA course G-318, Hazard Mitigation Planning Training, to our Riverwalk location the last week of March. It is a two day course, from 8a.m. to 5p.m. If this is something that you are interested please email Sarah at sbruns@rivco.org by **February 22, 2017**

LHMP 2017 County Hazard Ranking

Attached to this email participants will find the finalized hazard ranking for Riverside County for the 2017 LHMP. Each of these hazards will be addressed in the plan update. Please note, these rankings are for the county plan and do not affect your jurisdictions rankings. However, we do ask that at a minimum you reference our rankings in your plan to illustrate the collaboration between plans.

Mapping Website Link

In previous LHMP workshops, we were informed that some participants were having trouble accessing Hazus. After talking about this issue with the Cal OES, they provided us with an alternative option for jurisdictions to create maps. Unfortunately, we were informed that we are not able to make one whole county map for reference, each jurisdiction must include jurisdiction specific maps. The link to Cal OES's MyPlan system is www.myplan.caloes.ca.gov. This website is very user friendly and includes information on flood, fire, faults zones and licensed healthcare facilities. If you need any further assistance in mapping or using this alternative link, please feel free to reach out to us.

In addition, NOAA has climate mapping that you can add to your plan. The link is https://www.climate.gov/maps-data.

Senate Bill 379

We would like to inform all jurisdictions that according to a Senate Bill (SB 379), the county and cities need to incorporate their LHMP into their General Plan by the year 2022. Riverside County's LHMP was adopted into the General Plan in 2015. If your plan is not yet incorporated, we ask that you add this as a mitigation action for the 2017 LHMP update for your jurisdiction. The link to view and read the entire bill is as follows: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB379

Senate Bill 1000

In addition to SB 379, 1000 must also be incorporated by 2022. This bill states that *"climate adaptation and resilience strategies* [must be incorporated], *upon either the next revision of a local hazard mitigation plan after a specified date or on or before January 1, 2022"*. The link to view and read the entire bill is as follows: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1000
If you have any questions or concerns, as always please feel free to contact me or Sarah. Thank you and have a great day!

Thank you,

Melanie Gonzalez

Health Education Assistant II
Emergency Management Department
4210 Riverwalk Pkwy, Suite 300
Riverside CA.92505
Mail Stop: 3942
Direct Line: 951-955-5505
Work Cell: 951-476-4009
Main Department Line: 951-358-7100
Email: Melanie.Gonzalez@rivco.org

From:	Bruns, Sarah E
To:	Gina Moran-McGough
Subject:	Accepted: LHMP meeting w/ EMD

HOME CONTACT US Quick Links

city of corona THE CIRCLE CITY

ABOUT CORONA | CITY COUNCIL | CITY DEPARTMENTS | ONLINE SERVICES

Local Hazard Mitigation Plan Update SURVEY

SEARCH

HOME > CITY DEPARTMENTS > FIRE DEPARTMENT > LHMP UPDATE SURVEY

LOCAL HAZARD MITIGATION PLAN UPDATE

LOCAL HAZARD MITIGATION PLAN UPDATE

The City of Corona is conducting a 5 year update to our Local Hazard Mitigation Plan (LHMP). The intent of the plan is to help identify, reduce or remove long-term risk and protect people and property from the effects of events like earthquake, fire, flood, terrorism, etc. Under the Disaster Mitigation Act of 2000 (Public Law 106-390), State, Local and Tribal governments are required to develop a hazard mitigation plan to be eligible for certain federal disaster assistance.

HAZARD MITIGATION

Hazard mitigation planning is the process governments use to identify risks and vulnerabilities associated with natural disasters and to develop long-term strategies for protecting people and property in future hazard events. The process results in a mitigation plan that offers a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage. The planning process and the resultant plan bring together a framework for developing feasible and cost-effective mitigation projects. It is important to state that there may not be funds currently available for identified projects, but it is important to identify them, in the event funds become available during this plan life cycle.

OPPORTUNITIES FOR INPUT

A draft of the current LHMP is available for review and comment by the public and all interested stakeholders. Our hopes are to receive public input as to hazards unique to our jurisdiction that may not have been addressed in the master planning document or may not have been an identified hazard at the time the 2012 plan was written. This feedback will be used during the review and updating process.

SURVEY

Local Hazard Mitigation Plan Update SURVEY

LHMP Update

- Community Development
- Department of Water & Power
- Finance
- Fire Department
  - About Our Department
  - Emergency Information
  - Fire Prevention and Planning
  - LHMP Update Survey
  - News and Events
  - Preparedness
  - Programs and Services
  - Safety Information
  - Sharps Disposal
  - The Fire Explorer Program
- Human Resources
- Information Technology
- Library
- Maintenance Services
- Management Services
- Police Department
- Public Works
- Recreation Services

- Community Development
- Department of Water & Power
- Finance
- Fire Department
  - About Our Department
  - Emergency Information
  - Fire Prevention and Planning
  - LHMP Update Survey


Corona Fire Department
Page
Messages
Notifications 3
Insights
Publishing Tools
Like
Follow
Share
4,684 people reached
Boost Post
Like
Comment
Share
Sharon Andrade, Adolfo Aguilar and 118 others
Write a comment...
Corona Fire Department
@CoronaFireDept
Home
About
Events
Posts
Videos
Photos
Likes
Reviews
Jobs
Promote
Corona Fire Department
Published by Brittany Ritzi Foust [?] · April 13 at 5:38pm ·
[LINK TO SURVEY: http://www.discovercorona.com/…/Fir…/LHMP-Update-Survey.aspx]
The City of Corona is conducting a 5-year update to our Local Hazard Mitigation Plan (LHMP). The intent of the plan is to help identify, reduce or remove long-term risk and protect people and property from the effects of events like earthquake, fire, flood, terrorism, etc.
A draft of the current LHMP is available for review and comment by the public and all interested stakeholders. Our hopes ar... See More
Green River
LOCAL HAZARD MITIGATION PLAN UPDATE
COMMUNITY INPUT NEEDED
PLEASE TAKE OUR SURVEY
3,527 people reached
Boost Post
Like
Comment
Share

CERT Leadership Agenda

March 23, 2017 7:00 PM to 9:00 PM

Instructor: Richard Boltinghouse

I. Welcome
II. CERT Animal Response Module I
III. Discussion on Local Hazard Mitigation Plan for the City of Corona- The purpose of the local hazard mitigation plan is to identify the hazards, review and assess past disaster occurrences, estimate the probability of future occurrences and set goals to mitigate potential risks to reduce or eliminate long-term risk to people and property from natural and man-made hazards.
IV. CERT upcoming Community Events
V. End of meeting

Corona Fire Department – Emergency Services Division
Community Discussion: Local Hazard Mitigation Planning
ESD Representative: Richard Boltinghouse
March 23, 2017

Name	Signature
SAUD AHMED BOBY	[signature]
Rebecca Nunez	[signature]
PAT STEET	psteet
Kim Victorine	[signature]
Patti Victorine	Patti Victorine
Remy wilbourne	[signature]
Jeremy Smith	[signature]
Cari Smith	[signature]
CJ Roach	[signature]
Michelle Kolano	[signature]
Beverly Smallwood	Beverly Smallwood
Adriana Miranda	Adriana Miranda

City of Corona LHMP Planning

Public Meeting
Hazard Ranking & Proposed Mitigation Projects
4/27/17

Print Name	***Zip Code/Area***	***Signature***
1. [illegible] Victorin	92879	[illegible]
2. Patti Victorine	92879	Patti Victorine
3. Chelie Volano	92881	Michelle [illegible]
4. PAT STEET	92879	psteet
5. BEVerly Smallwood	92882	Beverly Smallwood
6. Adrianex Miranda	92879	Adriana Miranda
7. Lisa Powell	92880	Lisa Powell
8. SAUD AHMED BOBY	[illegible]	92881
9.		
10.		
11.		
12.		
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25.		

City of Corona 2017 Planning

Representatives from multiple City departments contributed in the updating of the 2012 Local Hazard Mitigation Plan. The team assisted in the development of mitigation strategies and projects based on the risk and hazard ranking assessment, they identified completion of past projects, assisted with public outreach, and provided updated City data and statistics.

Name	Title	Signature
David Duffy	Fire Chief	
Mike Samuels	Deputy Fire Chief	M. [illegible]
Gina McGough	Emergency Services Coordinator	Gina McGough
Richard Boltinghouse	CERT Program Lead	R. Boltinghouse
Cindi Schmitz	Fire Marshal	C. Schmitz
Jennifer Schaefer	Finance CDBG Manager	Jenn Schaef
Nelson Nelson	Public Works Director / City Engineer	Nelson Nelson
Tom Koper	Assistant Public Works Director	Tom [illegible]
Ryan Cortez	Economic Development Coordinator	[illegible]
Brittany Ritzi	Community Information Specialist	Brittany Ritzi
Tom Moody	Assistant General Manager	[illegible]
Ed Lockhart	Maintenance Manager	[illegible]
Tracy Martin,	Utility Project Manager	Tracy Martin
Katie Hockett	Operations Manager	Kathy Hockett
Jerry Rodriguez	Police Captain	[illegible]
Chris Milosevic	Building Official/Inspection Manager	[illegible]

APPENDIX B – INVENTORY WORKSHEETS

RIVERSIDE COUNTY MULTI-JURISDICTIONAL

LOCAL HAZARD MITIGATION AGENCY

2016 INVENTORY WORKSHEETS

City of Corona
June 2017

TABLE OF CONTENTS

Introduction: These documents are meant to be discussed, used and reviewed by a multi-disciplinary team. The Participation by a wide range of stakeholders who play a role in identifying and implementing mitigation actions is required.

SPECIAL CONCERNS:

1. *The completed Letter of Commitment has been returned to EMD*
2. *The completed Letter of Participation has been returned to EMD*

1. Local Jurisdiction Contact Information	Page 3
2. Hazard Identification Questionnaire	Pages 4-6
3. Specific Hazards Summary	Page 7
4. Jurisdiction Vulnerability Worksheet	Pages 8-9
5. Jurisdiction Mitigation Strategies and Goals	Pages 10-14
6. Local Jurisdiction Proposed Mitigation Action and Strategy Proposal	Pages 14-16
7. Local Jurisdiction Development Trends	Pages 17-18
8. Appendix A-Plan Review Tool	Pages A1-10

Appendix A the Plan Review Tool for your reference. This is the document Cal EMA and FEMA will utilize to verify that all of the required information is in the submitted documents.

1. LOCAL JURISDICTION CONTACT INFORMATION

The information on this page identifies:

- Jurisdiction and the contact person
- Jurisdiction's service area size and population
- EOP Plan and a Safety Element of their General Plan

PLEASE PROVIDE THE FOLLOWING INFORMATION:

Agency/Jurisdiction:		City of Corona	
Type Agency/Jurisdiction:		Local Government	
Contact Person:	Title:	Emergency Services Coordinator	
First Name:	Gina	Last Name:	Moran - McGough
Agency Address:	Street:	735 Public Safety Way	
	City:	Corona	
	State:	CA	
	Zip:	92880	
Contact Phone	951-736-2458	FAX	951-736-2497
E-mail	Gina.Moran-McGough@CoronaCA.gov		

Population Served	167,759	Square Miles Served	39.2

Does your organization have a general plan?	yes
Does your organization have a safety component to the general plan?	yes
What year was your plan last updated?	2008

Does your organization have a disaster/emergency operations plan?	yes
What year was your plan last updated?	2012
Do you have a recovery annex or section in your plan?	yes
Do you have a terrorism/WMD annex or section in your plan?	yes

2. Hazard Identification Questionnaire

The purpose of the questionnaire is to help identify the hazards within your service area. The list was developed from the first round of meetings with the various working groups in the 2005 plan creation, and from the hazards listed in the County's General Plan. Each hazard is discussed in detail in Part I of the 2005 LHMP. The information will be used as the basis for each jurisdiction to evaluate its capabilities, determine its needs, and to assist in developing goals and strategies. The information identifies:

a) What hazards can be identified within or adjacent to the service area of the jurisdiction.
b) Which of those hazards have had reoccurring events
c) What specific hazards and risks are considered by the jurisdiction to be a threat specifically to the jurisdiction? (These locations should be identified by name and location for inclusion in the Specific Hazard Summary Table).
    a. Specific types of facilities owned and operated by the jurisdiction.
    b. Locations damaged from prior disasters or hazard causing events.
d) Information about the jurisdiction's EOC

With your Multi-Disciplinary Planning Team:

a. Instructions for Updating Jurisdictions, with your planning team: Review your old Questionnaire for accuracy and relevance, mark changes.
b. Instructions for New Jurisdictions and Special Districts, with your planning team, meet and go over the questionnaire. Fill in YES, NO or NA on the Questionnaire.

HAZARD IDENTIFICATION QUESTIONNAIRE

DOES YOUR ORGANIZATION HAVE:	
AIRPORT IN JURISDICTION	Yes
AIRPORT NEXT TO JURISDICTION	No
DAIRY INDUSTRY	No
POULTRY INDUSTRY	No
CROPS/ORCHARDS	No
DAMS IN JURISDICTION	Yes
DAMS NEXT TO JURISDICTION	Yes
LAKE/RESERVOIR IN JURISDICTION	Yes
LAKE/RESERVOIR NEAR JURISDICTION	Yes
JURISDICTION IN FLOOD PLAIN	Yes
CONTROLLED FLOOD CONTROL CHANNEL	Yes
UNCONTROLLED FLOOD CONTROL CHANNEL	Yes
EARTHQUAKE FAULTS IN JURISDICTION	Yes
EARTHQUAKE FAULTS NEXT TO JURISDICTION	Yes
MOBILE HOME PARKS	Yes
NON-REINFORCED FREEWAY BRIDGES	No
NON-REINFORCED BRIDGES	No
BRIDGES IN FLOOD PLAIN	No
BRIDGES OVER OR ACROSS RIVER/STREAM	Yes
ROADWAY CROSSING RIVER/STREAM	No
NON REINFORCED BUILDINGS	No
FREEWAY/MAJOR HIGHWAY IN JURISDICTION	Yes
FREEWAY/MAJOR HIGHWAY NEXT TO JURISDICTION	Yes
FOREST AREA IN JURISDICTION	No
FOREST AREA NEXT TO JURISDICTION	Yes
WITHIN THE 50 MILES SAN ONOFRE EVACUATION ZONE	Yes
MAJOR GAS/OIL PIPELINES IN JURISDICTION	Yes
MAJOR GAS/OIL PIPELINES NEXT TO JURISDICTION	Yes
RAILROAD TRACKS IN JURISDICTION	Yes
RAILROAD TRACKS NEXT TO JURISDICTION	Yes
HAZARDOUS WASTE FACILITIES IN JURISDICTION	Yes
HAZARDOUS WASTE FACILITIES NEXT TO JURISDICTION	Yes
HAZARDOUS STORAGE FACILITIES IN JURISDICTION	Yes
HAZARDOUS STORAGE FACILITIES NEXT TO JURISDICTION	Yes
DOES YOUR ORGANIZATION OWN OR OPERATE A FACILITY	
IN A FLOOD PLAIN	Yes
NEAR FLOOD PLAIN	Yes
NEAR RAILROAD TRACKS	Yes
NEAR A DAM	Yes
UPSTREAM FROM A DAM	Yes
DOWNSTREAM FROM A DAM	Yes
DOWNSTREAM OF A LAKE	Yes
DOWNSTREAM FROM A RESERVOIR	Yes
NEAR A CONTROLLED FLOOD CONTROL CHANNEL	Yes
NEAR UNCONTROLLED FLOOD CONTROL CHANNEL	Yes
ON AN EARTHQUAKE FAULT	Yes
NEAR AN EARTHQUAKE FAULT	Yes
WITHIN THE 50 MILE SAN ONOFRE EVACUATION ZONE	Yes
IN A FOREST AREA	No
NEAR A FOREST AREA	Yes

NEAR A MAJOR HIGHWAY	Yes
A HAZARDOUS WASTE FACILITY	Yes
NEAR A HAZARDOUS WASTE FACILITY	Yes
A HAZARDOUS STORAGE FACILITY	Yes
NEAR A HAZARDOUS STORAGE FACILITY	Yes
NON REINFORCED BUILDINGS	No
A MAJOR GAS/OIL PIPELINE	No
NEAR A MAJOR GAS/OIL PIPELINE	Yes
DOES YOUR ORGANIZATION HAVE ANY LOCATIONS THAT:	
HAVE BEEN DAMAGED BY EARTHQUAKE AND NOT REPAIRED	No
HAVE BEEN DAMAGED BY FLOOD	Yes
HAVE BEEN DAMAGED BY FLOOD MORE THAN ONCE	Yes
HAVE BEEN DAMAGED BY FOREST FIRE	No
HAVE BEEN DAMAGED BY FOREST FIRE MORE THAN ONCE	No
HAVE BEEN IMPACTED BY A TRANSPORTATION ACCIDENT	Yes
HAVE BEEN IMPACTED BY A PIPELINE EVENT	No
EMERGENCY OPERATIONS INFORMATION	
DOES YOUR ORGANIZATION HAVE AN EOC	Yes
IS YOUR EOC LOCATED IN A FLOOD PLAIN	Yes
NEAR FLOOD PLAIN	Yes
NEAR RAILROAD TRACKS	Yes
NEAR A DAM	Yes
UPSTREAM FROM A DAM	Yes
DOWNSTREAM FROM A DAM	Yes
DOWNSTREAM OF A LAKE	Yes
DOWNSTREAM FROM A RESERVOIR	Yes
NEAR A CONTROLLED FLOOD CONTROL CHANNEL	Yes
NEAR UNCONTROLLED FLOOD CONTROL CHANNEL	Yes
ON AN EARTHQUAKE FAULT	No
NEAR AN EARTHQUAKE FAULT	Yes
WITHIN THE 50 MILE SAN ONOFRE EVACUATION ZONE	Yes
IN A FOREST AREA	No
NEAR A FOREST AREA	Yes
NEAR A MAJOR HIGHWAY	Yes
A HAZARDOUS WASTE FACILITY	Yes
NEAR A HAZARDOUS WASTE FACILITY	Yes
A HAZARDOUS STORAGE FACILITY	Yes
NEAR A HAZARDOUS STORAGE FACILITY	Yes
NON REINFORCED BUILDINGS	No
A MAJOR GAS/OIL PIPELINE	Yes
NEAR A MAJOR GAS/OIL PIPELINE	Yes
OTHER FACILITY INFORMATION **ARE THERE LOCATIONS WITHIN YOUR JURISDICTION THAT:**	
COULD BE CONSIDERED A TERRORIST TARGET	Yes
COULD BE CONSIDERED A BIO-HAZARD RISK	Yes

With your planning team, list the “Yes” answers and discuss. Use the information as a group to summarize your jurisdiction’s hazards and vulnerabilities.

3. SPECIFIC HAZARDS SUMMARY

This table helps to identify the information (name, owner, location, etc.) about the specific hazards identified in the Hazard Questionnaire.

In the Summary Table, list the basic information of the hazards identified by the jurisdiction in the Hazard Identification Questionnaire as a potential threat. These specific hazards were used in the development of response plans, maps, and other analysis data.

a. Instructions for Updating Jurisdictions and Special Districts: With your planning team, review the "Yes" answers and see if there were any changes, if so summarize why there is a difference from the 2012.

b. Instructions for New Jurisdictions and Special Districts: With your planning team, review the "Yes" answers and discuss. Use the information as a group to summarize your jurisdiction's hazards and vulnerabilities.

SPECIFIC HAZARDS SUMMARY

Jurisdiction	Hazard Type	Hazard Name	In Jurisdiction?	Adjacent to Jurisdiction?
Corona	Dam	Lake Mathews	No	Yes
	Dam	Prado	No	Yes
	Fault	Elsinore	Yes	Yes
	Flood Channel	Mabey Canyon	Yes	No
	Flood Channel	Temescal Creek	Yes	Yes
	Hazmat Manufacturing Facility	Downs Energy	Yes	No
	Hazmat Manufacturing Facility	Dart Containers	Yes	No
	Hazmat Manufacturing Facility	G & S Associates	Yes	No
	Hazmat Manufacturing Facility	Golden Cheese	Yes	No
	Hazmat Manufacturing Facility	GTM, Inc.	Yes	No
	Hazmat Manufacturing Facility	Hi-Country	Yes	No
	Hazmat Manufacturing Facility	Us Battery	Yes	No
	Hazmat Manufacturing Facility	Watson Pharmaceuticals	Yes	No
	Hazmat Storage Location	Advanced Fuel Filtration	Yes	No
	Hazmat Storage Location	All American Asphalt	Yes	No
	Hazmat Storage Location	Liston Aluminum	Yes	No
	Hazmat Storage Location	United Agri Products	Yes	No
	Lake	Lake Mathews	No	Yes
	Pipeline	Four Corners Oil Pipeline	Yes	No
	Pipeline	Natural Gas	Yes	No
	Railroad Track	BNSF	Yes	No
	Reservoir	Lake Mathews	No	Yes
	River	Santa Ana River	No	Yes

4. JURISDICTION VULNERABILITY WORKSHEET

This table is a listing of the primary hazards identified by the 2012 LHMP working groups. Each jurisdiction was asked to evaluate the potential for an event to occur in their jurisdiction by hazard. They were also asked to evaluate the potential impact of that event by hazard on their jurisdiction. The impact potential was determined based on:

1. Economic loss and recovery
2. Physical loss to structures (residential, commercial, and critical facilities)
3. The loss or damage to the jurisdictions infrastructure
4. Their ability to continue with normal daily governmental activities
5. Their ability to quickly recover from the event and return to normal daily activities
6. The loss of life and potential injuries from the event.

The jurisdictions were asked to rate the potential and severity using a scale of between 0 and 4 (4 being the most severe). The jurisdictions were also asked to rank the listed hazards as they relate to their jurisdiction from 1 to 19 (1 being the highest overall threat to their jurisdiction).

With the assistance of the RCIP Plan and County Departments, Riverside County EMD conducted an extensive evaluation of the severity and probability potential for the county as a whole. The hazards were also ranked for the County. Those numbers and rankings were provided to the jurisdictions as a comparison guide.

A separate table was created to address the hazards relating to agriculture and was assessed by the agriculture working group.

a. Instructions for Updating Jurisdictions and Special Districts: Please review the table, determine if your ranking from the 2012 LHMP remains the same, and note that Pandemic has been added to the list. Please discuss and document new or unchanged severity and rankings.

b. Instructions for New Jurisdictions and Special Districts: Please evaluate the potential for an event to occur in your jurisdiction by hazard. Then, evaluate the potential impact of that event by hazard on your jurisdiction according to #1-6 from the potential impact list above.

NOTE: Under Medical, Pandemic was added. This was a result of the H1N1 and other incidents.

NAME: City of Corona AGENCY: DATE : 3/20/2017

	COUNTY		CITY OF CORONA		
HAZARD	**SEVERITY 0 - 4**	**PROBABILITY 0 - 4**	**SEVERITY 0 - 4**	**PROBABILITY 0 - 4**	**RANKING 1 - 19**
EARTHQUAKE	4	2	4	3	1
WILDLAND FIRE	3	4	3	3	2
FLOOD	3	3	3	3	6
OTHER NATURAL HAZARDS					
DROUGHT	3	3	3	3	12
LANDSLIDES	3	3	2	1	20
INSECT INFESTATION	2	3	1	1	18
EXTREME SUMMER/WINTER WEATHER	3	2	2	2	13
SEVERE WIND EVENT					NA
AGRICULTURAL					
DISEASE/CONTAMINATION	3	3	3	3	7
TERRORISM	3	1	4	2	4
OTHER MAN-MADE					
PIPELINE	3	2	3	2	19
AQUEDUCT	3	2	2	2	22
TRANSPORTATION	3	2	3	2	8
POWER OUTAGE	4	4	4	4	3
HAZMAT ACCIDENTS	3	4	3	2	14
NUCLEAR ACCIDENT	4	1	4	1	17
TERRORISM	3	1	4	2	4
CIVIL UNREST	3	2	2	2	16
JAIL/PRISON EVENT	2	1	1	2	21
MEDICAL					
PANDEMIC	4	2	4	2	10

5. JURISDICTION MITIGATION STRATEGIES AND GOALS

This comprehensive table is a listing of the various mitigation strategies, goals, and objectives developed by the 2012 LHMP working groups. The jurisdictions were also given the opportunity to list additional strategies, goals, and objectives specific to either their jurisdiction or their workgroup (i.e. the hospitals, agriculture, etc.).

LOCAL JURISDICTION MITIGATION STRATEGIES AND GOALS
With your Planning Team

a. Instructions for Updating Jurisdictions and Special Districts: please review the table; determine if your ranking from the 2012 LHMP remains the same.

b. Instructions for New Jurisdictions and Special Districts: please follow below:

Please evaluate the priority level for each listed mitigation goal identified below as it relates to your jurisdiction or facility. If you have any additional mitigation goals or recommendations, please list them at the end of this document.

Place an H (High), M (Medium), L (Low), or N/A (Not Applicable) for your priority level for each mitigation goal in the box next to the activity.

EARTHQUAKE	
M	Aggressive public education campaign in light of predictions
M	Generate new literature for dissemination to:
M	◊ Government employees
M	◊ Businesses
L	◊ Hotel/motel literature
M	◊ Local radio stations for education
M	◊ Public education via utilities
M	◊ Identify/create television documentary content
M	Improve the Emergency Alert System (EAS)
M	◊ Consider integration with radio notification systems
H	◊ Upgrade alerting and warning systems for hearing impaired
H	◊ Training and maintenance
L	Procure earthquake-warning devices for critical facilities
H	Reinforce emergency response facilities
N/A	Provide training to hospital staffs
L	Require earthquake gas shutoffs on remodels/new construction
M	Evaluate re-enforcing reservoir concrete bases
L	Evaluate EOCs for seismic stability
H	Install earthquake cutoffs at reservoirs
M	Install earthquake-warning devices at critical facilities
L	Develop a dam inundation plan for new Diamond Valley Reservoir
M	Earthquake retrofitting
N/A	◊ Bridges/dams/pipelines
L	◊ Government buildings/schools

N/A	◊ Mobile home parks
L	Develop educational materials on structural reinforcement and home inspections **(ALREADY DEVELOPED)**
M	Ensure Uniform Building Code compliance
M	◊ Update to current compliance when retrofitting
L	Insurance coverage on public facilities
L	Funding for non-structural abatement (Earthquake kits, etc.)
L	Pre - identify empty commercial space for seismic re-location
L	Electrical co-generation facilities need retrofitting/reinforcement (Palm Springs, others?)
L	Mapping of liquefaction zones
L	Incorporate County geologist data into planning
N/A	Backup water supplies for hospitals
M	Evaluate pipeline seismic resiliency
M	Pre-positioning of temporary response structures
M	Fire sprinkler ordinance for all structures
L	Evaluate adequacy of reservoir capacity for sprinkler systems
L	Training/standardization for contractors performing retrofitting
L	Website with mitigation/contractor/retrofitting information
L	◊ Links to jurisdictions
M	◊ Alerting information
L	◊ Volunteer information
M	Evaluate depths of aquifers/wells for adequacy during quakes
L	Evaluate hazmat storage regulations near faults
COMMUNICATIONS IN DISASTER ISSUES	
M	Communications Interoperability
M	Harden repeater sites
H	Continue existing interoperability project
N/A	Strengthen/harden
N/A	Relocate
H	Redundancy
M	Mobile repeaters
FLOODS	
L	Update development policies for flood plains
L	Public education on locations of flood plains
L	Develop multi-jurisdictional working group on floodplain management
L	Develop greenbelt requirements in new developments
L	Update weather pattern/flood plain maps
L	Conduct countywide study of flood barriers/channels/gates/water dispersal systems
M	Required water flow/runoff plans for new development
M	Perform GIS mapping of flood channels, etc.
L	Install vehicular crossing gates/physical barriers for road closure
H	Maintenance of storm sewers/flood channels
M	Create map of flood channels/diversions/water systems etc.
L	Require digital floor plans on new non-residential construction
M	Upgrade dirt embankments to concrete
N/A	Conduct countywide needs study on drainage capabilities

H	Increase number of pumping stations
L	Increase sandbag distribution capacities
M	Develop pre-planned response plan for floods
M	◊ Evacuation documentation
M	◊ Re-examine historical flooding data for potential street re-design
L	Training for city/county PIOs about flood issues
L	Warning systems - ensure accurate information provided
L	◊ Publicize flood plain information (website?)
L	◊ Install warning/water level signage
L	◊ Enhanced public information
L	◊ Road closure compliance
L	◊ Shelter locations
L	◊ Pre-event communications
L	Look at County requirements for neighborhood access
L	◊ Secondary means of ingress/egress
M	Vegetation restoration programs
M	Ensure critical facilities are hardened/backed up
L	Hardening water towers
L	Terrorism Surveillance - cameras at reservoirs/dams
M	Riverbed maintenance
M	Evaluate existing lift stations for adequacy
L	Acquisition of property for on-site retention
M	Evaluate regulations on roof drainage mechanism
M	Erosion-resistant plants
L	Traffic light protection
M	Upkeep of diversionary devices
M	Install more turn-off valves on pipelines
H	Backup generation facilities
H	Identify swift water rescue capabilities across County
WILDFIRES	
M	Aggressive weed abatement program
M	◊ Networking of agencies for weed abatement
N/A	Develop strategic plan for forest management
H	Public education on wildfire defense
M	Encourage citizen surveillance and reporting
L	Identify hydrants with equipment ownership information
M	Enhanced firefighting equipment
L	Fire spotter program/red flag program
L	◊ Expand to other utilities
N/A	Research on insect/pest mitigation technologies
L	Volunteer home inspection program
L	Public education program
L	◊ Weather reporting/alerting
M	◊ Building protection

L	◊ Respiration
M	Pre-identify shelters/recovery centers/other resources
M	Roofing materials/defensive spacing regulations
M	Community task forces for planning and education
M	Fuel/dead tree removal
L	Strategic pre-placement of firefighting equipment
L	Establish FEMA coordination processes based on ICS
M	Brush clearings around repeaters
L	Research new technologies for identifying/tracking fires
M	Procure/deploy backup communications equipment
N/A	"Red Tag" homes in advance of event
N/A	Provide fire-resistant gel to homeowners
L	Involve insurance agencies in mitigation programs
N/A	Clear out abandoned vehicles from oases
H	Code enforcement
H	Codes prohibiting fireworks
H	Fuel modification/removal
L	Evaluate building codes
H	Maintaining catch basins
OTHER HAZARDS	
N/A	Improve pipeline maintenance
N/A	Wetlands mosquito mitigation (West Nile Virus)
M	Insect control study
N/A	Increase County Vector Control capacities
H	General public drought awareness
H	◊ Lawn watering rotation
N/A	Develop County drought plan
H	Mitigation of landslide-prone areas
N/A	Develop winter storm sheltering plan
N/A	Ease permitting process for building transmission lines
L	Evaluate restrictions on dust/dirt/generating activities during wind seasons
N/A	Rotational crop planning/soil stabilization
N/A	Enhance agricultural checkpoint enforcement
N/A	Agriculture - funding of detection programs
M	Communications of pipeline maps (based on need to know)
M	Improved notification plan on runaway trains
M	Improve/maintain blackout notification plan.
M	Support business continuity planning for utility outages
H	Terrorism training/equipment for first responders
H	◊ Terrorism planning/coordination
M	◊ Staffing for terrorism mitigation
M	Create a SONGS regional planning group
L	◊ Include dirty bomb planning
M	Cooling stations - MOUs in place

N/A	Fire Ant eradication program
N/A	White Fly infestation abatement/eradication program
M	Develop plan for supplemental water sources
H	Public education on low water landscaping
N/A	Salton Sea desalinization
N/A	Establish agriculture security standards (focus on water supply)
M	ID mutual aid agreements
M	Vulnerability assessment on fiber-optic cable
N/A	Upgrade valves on California aqueduct
L	Public education
L	◊ Bi-lingual signs
L	◊ Power Outage information
M	Notification system for rail traffic - container contents
H	Control and release of terrorism intelligence
N/A	Develop prison evacuation plan (shelter in place?)

Use the list and rankings to narrow down or identify “your” strategies. The mitigation strategy serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy includes the development of goals, objectives, and prioritized mitigation actions.

Goals are general guidelines that explain what you want to achieve. They are broad policy statements and are usually long-term and represent global visions, such as “Protect Existing Property.”

Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific, measurable, and may have a defined completion date. Objectives are more specific, such as “Increase the number of buildings protected from flooding.”

The development of effective goals and objectives enables the planning team to evaluate the merits of alternative mitigation actions and the local conditions in which these activities would be pursued. A potential mitigation action that would support the goal and objective goal example above is “Acquire repetitive flood loss properties in the Acadia Woods Subdivision.”

In the 2012 LHMP, each jurisdiction was required to develop a Mitigation Strategy Proposal based on one of the following:

1. The strategy, goal, or objective rating "High Priority" on the Local Jurisdiction Mitigation Strategies and Goals (WORKSHEET ABOVE)
2. A specifically identified strategy, goal, or objective that was developed as part of one of the working groups planning sessions such as the hospitals or agriculture
3. A specifically identified strategy, goal, or objective that was developed as part of one of the jurisdiction's internal working group planning sessions

6. LOCAL JURISDICTION PROPOSED MITIGATION ACTION AND STRATEGY PROPOSAL

a. Instructions for Updating Jurisdictions and Special Districts: With your planning team, please review the table from # 5, and determine if your ranking from the 2012 LHMP remains the same.

Review the chosen Mitigation Strategy that your jurisdiction submitted. The updated plan **must** identify the completed, deleted, or deferred actions or activities from the previously approved plan as a benchmark for progress.

If the mitigation actions or activities remain unchanged from the previously approved plan, the updated plan **must** indicate why changes are not necessary. Further, the updated plan **shall** include in its prioritization any new mitigation actions identified since the previous plan was approved or through the plan update process.

b. Instructions for New Jurisdictions and Special Districts: With your planning team, Use the "High Priority" rated strategy, goal or objective as a starting point to determine your Mitigation Strategy Proposal.

LOCAL JURISDICTION PROPOSED MITIGATION ACTION AND STRATEGY PROPOSAL

Jurisdiction:	City of Corona
Contact:	Gina Moran-McGough
Phone:	951-736-2458

MITIGATION STRATEGY INFORMATION

Proposal Name:

DWP Emergency Generators

Proposal Location:

Citywide – Ground Water Wells and Blending station

Proposal Type

Place an "X" by the type of mitigation strategy (one or more may apply)

	Flood and mud flow mitigation
	Fire mitigation
	Elevation or acquisition of repetitively damaged structures or structures in high hazard areas
	Mitigation Planning (i.e. update building codes, planning develop guidelines, etc.)
	Development and implementation of mitigation education programs
	Development or improvement of warning systems
	Additional Hazard identification and analysis in support of the local hazard mitigation plan
	Drinking and/or irrigation water mitigation
X	Earthquake mitigation
	Agriculture - crop related mitigation
	Agriculture - animal related mitigation
	Flood inundation/Dam failure
	Weather/Temperature event mitigation

DESCRIPTION OF THE PROPOSED MITIGATION STRATEGY

Proposal/Event History	List any previous disaster related events (dates, costs, etc.) The proposed project is to purchase emergency generators for each ground water well and blending station as an earthquake mitigation strategy. The Mexico, Easter earthquake of 2010 caused significant damage to the water systems in Imperial County and the action is a result of lessons learned. There have been earthquakes in the region that have made it apparent that emergency generators will be necessary at ground water wells and blending station to lessen the possibility of water disruption.
Description of Mitigation Goal Narrative:	Give a detailed description of the need for the proposal, any history related to the proposal. List the activities necessary for its completion in the narrative section below, including estimated timeline. (how long will it take) Because the City of Corona is in an area of seismic faults, back-up power for pumping water at ground water wells to the community is a good mitigation measure. There have been earthquakes in the region that have made it apparent that emergency generators will be necessary at ground water wells and the blending station to lessen the possibility of water disruption.

Does your jurisdiction have primary responsibility for the proposal? If not, what agency does?

Yes	X	No		Responsible Agency: Dept. of Water and Power

FUNDING INFORMATION

Place an "X" by the proposed source of funding for this proposal

	Unfunded proposal - funds are not available for the proposal at this time
	Local jurisdiction General Fund
	Local jurisdiction Special Fund (road tax, assessment fees, etc.)
	Non-FEMA Hazard Mitigation Funds
X	Local Hazard Mitigation Grant Funds - Future Request
X	Hazard Mitigation Funds
X	Other none general fund source.
	Has your jurisdiction evaluated this mitigation strategy to determine its cost benefits? yes (i.e. has the cost of the mitigation proposal been determined to be beneficial in relationship to the potential damage or loss using the attached Cost/Benefit Analysis Sheet or another internal method)

As part of this process, each Submitting Jurisdiction is required to perform a cost-benefit analysis. They were required to answer the question at the bottom of the Proposal page that asks if they had conducted a Cost-Benefit Analysis of some type. This analysis was conducted either by completing a Cost Benefit form or by some other approved method. Many of the jurisdictions used the cost-effective analysis approach outlined in the FEMA publication, *Cost and Benefits of Natural Hazards Mitigation.* This cost-benefit analysis was not restricted to natural hazards.

In some cases, the jurisdiction or working group identified a proposal that highlighted a life- safety issue over a standard hazard proposal. This was done when there was either historical data or other sources of information indicating that the life-safety issue needed to be emphasized or brought to the public's attention.

LOCAL JURISDICTION DEVELOPMENT TRENDS QUESTIONNAIRE

JURISDICTION: CITY OF CORONA	DOES YOUR AGENCY HAVE RESPONSIBILITY FOR LAND USE AND/OR DEVELOPMENT ISSUES WITHIN YOUR JURISDICTIONAL BOUNDARIES? YES NO			
	2012 DATA	2017 DATA		2022
Current Population in Jurisdiction or Served	153,649	167,759	Projected Population in Jurisdiction or Served - in 2022	175,000
Current Sq. Miles in Jurisdiction or Served	39.2	39.2	Projected Sq. Miles in Jurisdiction or Served - in 2022	39.2
Does Your Jurisdiction have any ordinances or regulations dealing with disaster mitigation, disaster preparation, or disaster response?	Yes	Yes	If yes, please list ordinance or regulation number. Ordinance No. 2429, 1973, 2077 Corona Municipal Code Chapters 2.52, 3.36, 4.04.80, 7a, 15.12.270 Section 705	
What is the number one land issue your agency will face in the next five years	Economy and Infill/compact development			
Approximate Number of Homes/Apts/etc.	47,182	48,930	Projected Number of Homes/Apts/etc.- in 2022	50,500
Approximate Total Residential Value	$16.3 billion	$17.0 billion	Projected Residential Total Value - in 2022	$19.0 billion
Approximate Number of Commercial Businesses	5,205	9,000	Projected Number of Commercial Businesses - in 2022	9,500
Approximate Percentage of Homes/Apts/etc. in flood hazard zones	0.7%	0.7%	Approximate Percentage of Homes/Apts/etc. in flood hazard zones - in 2017	0.7%
Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones	3.5%	3.5%	Approximate Percentage of Homes/Apts/etc. in earthquake hazard zones - in 2022	3.5%
Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones	6.55%	6.55%	Approximate Percentage of Homes/Apts/etc. in wildland fire hazard zones - in 2022	6.55%
Approximate Percentage of Commercial Businesses in flood hazard zones	0.003%	0.7%	Approximate Percentage of Commercial Businesses in flood hazard zones - in 2022	0.7%
Approximate Percentage of Commercial Businesses in earthquake hazard zones	1.9%	0.3%	Approximate Percentage of Commercial Businesses in earthquake hazard zones - in 2022	0.3%
Approximate Percentage of Commercial Businesses in wildland fire hazard zones	4.5%	0	Approximate Percentage of Commercial Businesses in wildland fire hazard zones - in 2022	0
Number of Critical Facilities in your Jurisdiction that are in flood hazard zones	0	0	Projected Number of Critical Facilities in your Jurisdiction that are in flood hazard zones - in 2022	0
Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones	2	2	Number of Critical Facilities in your Jurisdiction that are in earthquake hazard zones - in 2022	2
Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones.	7	7	Number of Critical Facilities in your Jurisdiction that are in wildland fire hazard zones - in 2022	7
Does your jurisdiction plan on participating in the County's on-going plan maintenance program every two years as described in Part I of the plan?	Yes	Yes	If not, how will your jurisdiction do plan maintenance? N/A	
Will a copy of this plan be available for the various planning groups within your jurisdiction for use in future planning and budgeting purposes?				Yes

APPENDIX C – PLAN REVIEW TOOL/CROSSWALK

LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: City of Corona	**Title of Plan:** Local Hazard Mitigation Plan	**Date of Plan:** 6/16/2017
Local Point of Contact: Gina Moran-McGough	**Address:** 735 Public Safety Way Corona, CA 92880	
Title: Emergency Services Coordinator		
Agency: Fire Department		
Phone Number: 951-736-2458	**E-Mail:** Gina.Moran-McGough@CoronaCA.gov	

State Reviewer:	**Title:**	**Date:**

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region ***(insert #)***		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Section 2.1		
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Section 2.2		
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Section 2.3		
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Section 9.0		
A5. Is there discussion of how the community (ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Section 10.0 Section 8.0		

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Section 8.0		
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Section 3.4		
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Section 3.4		
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Section 4.4 Section 3.2		
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Section 5.1 Figure 4.4.2 pg.42		
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Section 6.1		
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Section 5.2		
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Section 7.1		
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Section 7.2 Section 7.3		

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	Location in Plan (section and/or page number)	Met	Not Met
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Section 7.2 Section 7.4		
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Section 9.0 Section 7.3		
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Section 1.4 Section 1.5 Section 1.6		
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Section 3.5		
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Section 3.1 Section 3.2 Section 3.3		
ELEMENT D: REQUIRED REVISIONS			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Plan Adoption/ Resolution Page 4 all plans		
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Plan Adoption/ Resolution Page 4 all plans		
ELEMENT E: REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												

MULTI-JURISDICTION SUMMARY SHEET												
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
12												
13												
14												
15												
16												
17												
18												
19												
20												

Excerpts from the Riverside County MJLHMP

COUNTY OF RIVERSIDE

Multi-Jurisdictional

Local Hazard Mitigation Plan

July 2018



Bruce Barton, Director

County of Riverside Emergency Management Department

4.3.2 2017 New Mitigation Actions

The 2017 LHMP Steering Committee identified the following Mitigation Actions since the completion of the 2012 plan update. These mitigation actions were prioritized based on the top ten high priority county hazards. This was determined using the county risk assessment that is shown on section 5.2 page 195 "**Figure 23:** 2017 County Hazard Ranking and Risk Scores." The actions below list ways that "all hazards" can be mitigated following the county's top ten hazards starting from the highest. The financial impact of each action does not affect the ranking.

Table 10: 2017 New Mitigation Actions Table

2017 Mitigation Actions Table

Type of Hazard	Mitigation Actions	Departments/ Jurisdictions	Status Update/Timeframe	Potential Funding Source
All Hazards	CERT Training and retention	Riverside County Emergency Management Department	July 2018 – Ongoing On-going for the life of the current plan (yrs. 2018-2023). There will be one training in each of the county districts per year to ensure community members throughout the county get the opportunity to refresh and reinforce their CERT skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	State Homeland Security Program (SHSP)
All Hazards	Continue to utilize the Safety Element of the Riverside County General Plan and the Riverside County FD Master Plan as base documents to implement goals, objectives, and mitigation actions	All Riverside County Departments	On-going for the life of the current plan (yrs. 2018-2023). The Safety Element in the General Plan is continuously updated as new information and changes arise. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Working with CalOES & FEMA to revise the Southern California Catastrophic	All Cities in Riverside County	On-going for the life of the current plan (yrs. 2018-2023). Riverside County will continue to collaborate with Cal OES/ FEMA to improve and update	County General Fund

	Earthquake Response Plan		this plan as needed. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	
Earthquake	Reviewed Office of Statewide Health Planning and Development (OSHPD), Structural Performance Categories and Nonstructural Performance Categories (SPC/NPC) Ratings of Acute Care Hospital Buildings and reported the findings at EM Healthcare Coalition	Riverside County Emergency Management Department & Riverside County Hospitals	On-going for the life of the current plan (yrs. 2018-2023).These reports will continuously be reviewed to make sure they are up to date and consistent with any changes. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	Hospital Preparedness Program (HPP) Grant
Earthquake	Worked with local City Emergency Manager (EM) to address '08 Golden Guardian Riverside County Shake Out Scenario/Assumptions	Riverside County Emergency Management Department	On-going for the life of the current plan (yrs. 2018-2023). County will continuously work with City EM to update and inform of changes or thoughts to improve the annual Shake Out Scenario and help the community increase their preparedness skills. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund
Earthquake	Mitigate potential seismic hazards through adoption and strict enforcement of current building codes	Riverside County Transportation, Land, Management Agency	On-going for the life of the current plan (yrs. 2018-2023). The codes will be revised and updated to be consistent with emergency measures that can help prevent earthquake impacts in county buildings. This action will be reassessed during the monitoring and update phase of the County's 2017 LHMP.	County General Fund

5.3.1 Earthquake

Severity: 4

Probability: 2

Risk Score: 3.50

OA Jurisdictions Affected by Earthquakes

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

Hazard Definition

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the Earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the Earth as the huge plates that form the Earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual. At other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

Where earthquakes have struck before, they can strike again, often without warning. The major form of direct damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse and dam failure may generate major downstream flooding. Buildings vary in susceptibility depending on their construction and the types of soils on which they are built. Earthquakes destroy utility infrastructure which, in turn, may set off fires, hinder rescue efforts, and impact normal functions for an extended period of time. The hazard of earthquakes varies from place to place depending on the regional and local geology. Ground shaking may occur 65 miles or more from the epicenter (the point on the ground surface above the focus). Ground shaking can change the mechanical properties of some fine grained, saturated soils, where upon the soils liquefy and act as a fluid (liquefaction).

Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking.

Figure 29: Historical Earthquakes in the Riverside County Area - 5.0 and Above

Year	Richter Scale Magnitude	Description
1812	7.0	Occurred on the southern section of the San Andreas fault near Wrightwood.
1857	7.9	Occurred 60 miles northwest of Fort Tejon and ruptured 225 miles of the San Andreas fault.
1890	6.5	Occurred in the "San Jacinto or Elsinore Fault region" on the Rockhorse Truck Trail, north of the Borrego Valley Airport.
1890	6.5	Occurred in the same region as the 1890 earthquake.
1899	6.4	San Jacinto earthquake destroys San Jacinto and Hemet
1910	5.0	Occurred on the Elsinore fault northwest of the City of Lake Elsinore.
1918	6.9	San Jacinto earthquake strikes the same area that was damaged by an earthquake 19 years earlier.
1923	6.3	North San Jacinto Fault earthquake damaged the San Bernardino and Redlands area. This the last known time that this fault, which runs under the I-215/I-10 interchange, ruptured in this area.
1937	6.0	Terwilliger Valley earthquake was in the same general area as the 1890 earthquake.
1942	6.3	Fish Creek Mountains earthquake was south of the Ocotillo airport.
1954	6.2	Arroyo Salada earthquake was west of the Salton Sea.
1968	6.5	Borrego Mountain Earthquake was northeast of Ocotillo Wells
1987	6.6	Superstition Hills earthquake near the Salton Sea
1992	7.2	Occurred near Landers, California and caused the rupture of five different faults. Those faults were: Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock.
1992	7.3	Occurred 3 hours after the Landers Earthquake with an epicenter near Big Bear, CA
1994	6.8	Northridge Earthquake
1999	7.4	Hector Mine Earthquake
2010	5.4	Borrego Springs earthquake believed by seismologists to have been possibly triggered by the strong earthquake which occurred near Calexico in 2010.

Located within Riverside County are several known active and potentially active earthquake faults, including the San Andreas Fault, San Jacinto Fault, and Elsinore Fault In the event of an earthquake, the location of the epicenter, as well as the time of day and season of the year, would have a profound effect on the number of deaths and casualties, as well as property damage.

Research centers devoted to the detection and logging of earthquake events record the ongoing weekly activity of small magnitude in Riverside County faults. The most recent earthquake in Riverside County was located in Banning on July 7, 2017, and had a magnitude of 1.1. There are a number of small scale earthquakes that happen weekly but larger scale or catastrophe shaking is less likely.

A **moderate** earthquake occurring in or near Riverside County could result in deaths, casualties, property damage, environmental damage, and disruption of normal government and community services. The effects could be aggravated by collateral emergencies such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, and the possible failure of several dams in Riverside County. The community needs would most likely exceed the response capability of the County's emergency management organizations, requiring mutual assistance from volunteer and private agencies, the California Office of Emergency Services (Cal OES), and the Federal Emergency Support Functions.

A **catastrophic** earthquake in Riverside County could cause thousands of casualties, extensive major property damage, disruption in communications and utility systems, disruption in supply and distribution systems, and general panic. An earthquake of this magnitude could directly affect all of Riverside County and most of southern California, causing a critical demand on mutual aid resources and competition for national relief.

Key effects and response considerations:

- **Effects on people and housing.** In any earthquake, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health for reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to remove debris and clear roadways, demolish unsafe structures, assist in re-establishing public services and utilities, and provide continuing care and temporary housing for affected citizens.

  A survey of local, State, and Federal government emergency plans indicate that although there is a general capacity to respond to small and intermediate-sized earthquakes, it is unlikely that any of these governmental units will be able to cope with the immediate impact of a great quake, such as a Magnitude (M) 8.3 event on the south-central San Andreas fault. The general public must realize that the assistance that they have been used to expecting simply will not be immediately available. In fact, in the event of an earthquake of such magnitude, citizens must be prepared to wait for up to 72 hours or more for any type of organized response.

- **Effects on commercial and industrial structures.** After any earthquake, individuals are likely to lose wages due to the inability of businesses to function because of damaged goods and/or facilities. With business losses, the County of Riverside and the cities in the Riverside County Operational Area will lose revenue. Economic recovery from even a minor earthquake will be critical to the communities involved.

- **Effects on infrastructure.** The damage caused by an earthquake can lead to the paralysis of the local infrastructure: police, fire, medical and governmental services.

- **Effects on Critical Facilities.** A large number of critical facilities have been identified as being adjacent to the various faults in the County and surrounding counties. The list of facilities includes hospitals, fire stations, law enforcement facilities, and schools.

  Effects on agriculture. Earthquakes can cause loss of human life, loss of animal life, and property damage to structures and land dedicated to agricultural uses. The most significant long-term impacts on agriculture from earthquakes are those that arise from the cascading effects of fire and flood.

Historically, the San Andreas Fault is the most active among the fault network that cuts through rocks of the California coastal region. The entire San Andreas Fault system is more than 800 miles long and extends to depths of at least 10 miles within the earth. The San Andreas Fault in California forms a continuous, narrow break in the earth's crust that extends from northern California southward to Cajon Pass near San Bernardino; southeastward from Cajon Pass. Several branching faults, including the San Jacinto and Banning faults, share the movement of the crustal plates as the fault continues to the south east, on to the Salton Sea and on to Baja California Sea of Cortez.

Recent studies of the eastern section of the San Andreas near San Gorgonio Pass reveal that this area is more advanced in the cycle of strain accumulation than the western area at the Cajon Pass. Earthquake activity around the Southern San Andreas, including the June 1992 Landers-Big Bear earthquakes, has prompted scientists to increase their studies of this area.

The San Jacinto fault has had a higher level of moderate-to- large earthquakes during the past 50 to 100 years, although the rate of slip is not as high. Geodetic data indicates there is an "appreciable" strain accumulation across both faults, implying that either one or both may be primed for release. One of the larger and more active fault segments of the San Jacinto fault, the Casa Loma Faults, runs from near Perris Reservoir to just north of Anza. Also, another large and active named segment is the Clark Fault, which runs from near Hemet to just 9 miles southwest of the shore of the Salton Sea. Historically, this section of the San Jacinto Fault produced a series of large earthquakes starting in 1899 on average every 14 years with the longest interval being 19 years. The last slip occurred on the Superstition Hills and Elmore Ranch sequence in1987. In 2015, the Working Group on California Earthquake Probabilities (WGCEP) estimated 30-year probabilities of 19 percent for an M 6.7 and larger event on the Southern San Jacinto Fault.

A third major fault zone that traverses Riverside County is the Elsinore Fault. The Elsinore Fault Zone is one of the largest in southern California. The main trace of the Elsinore fault zone has only seen one historical event greater than magnitude 5.2 – the earthquake of 1910, a magnitude 6 shock near Temescal Valley.

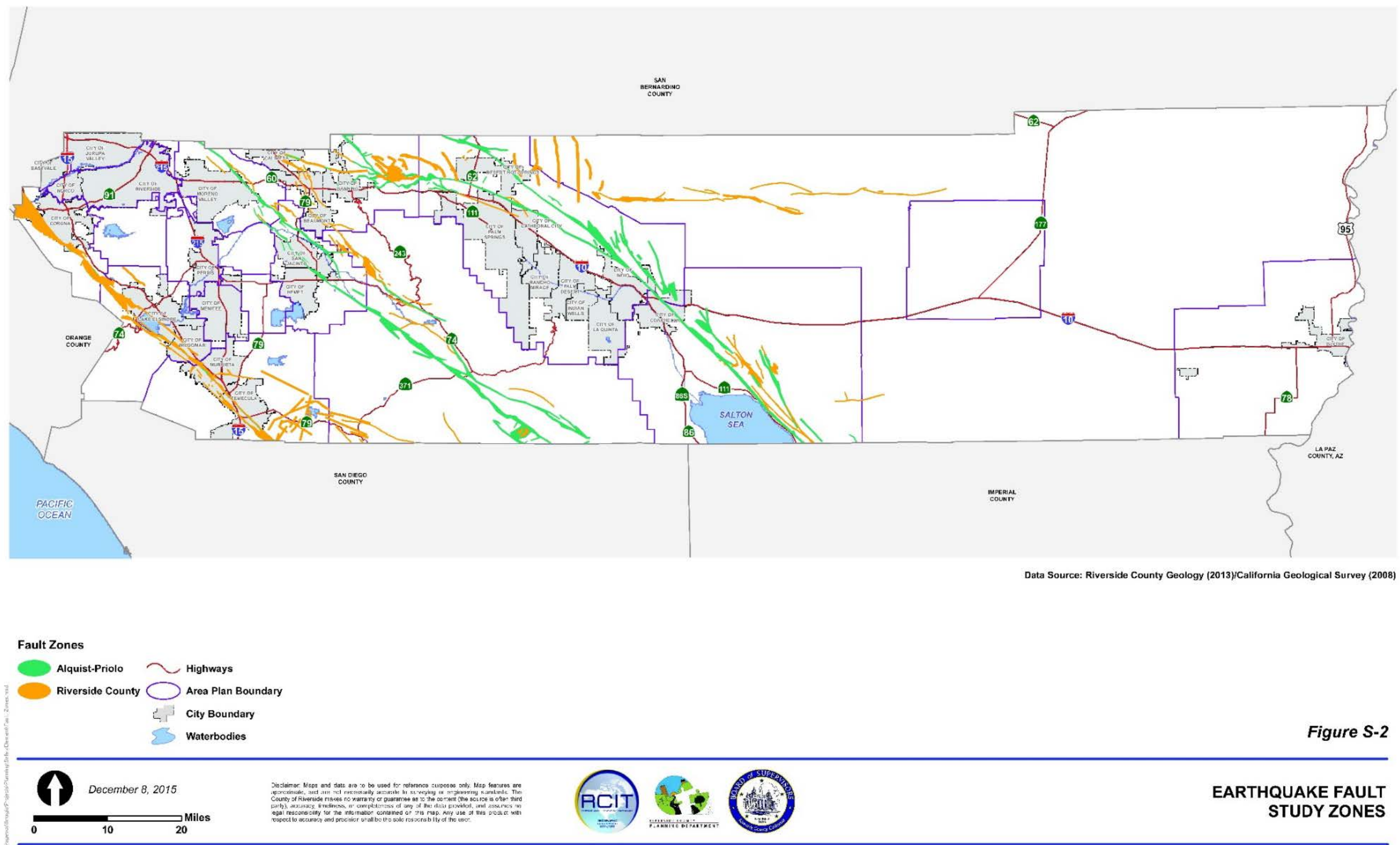
Risk Assessment Conclusion.

Riverside County is at risk for a significant earthquake causing catastrophic damage and strains on response and mitigation resources. Both property and human life are at high risk. The County experiences hundreds of minor quakes and tremblers each month from the myriad of faults in the area. Studies indicate that stress is building up in major faults like the San Andreas. A major quake could happen at any time.

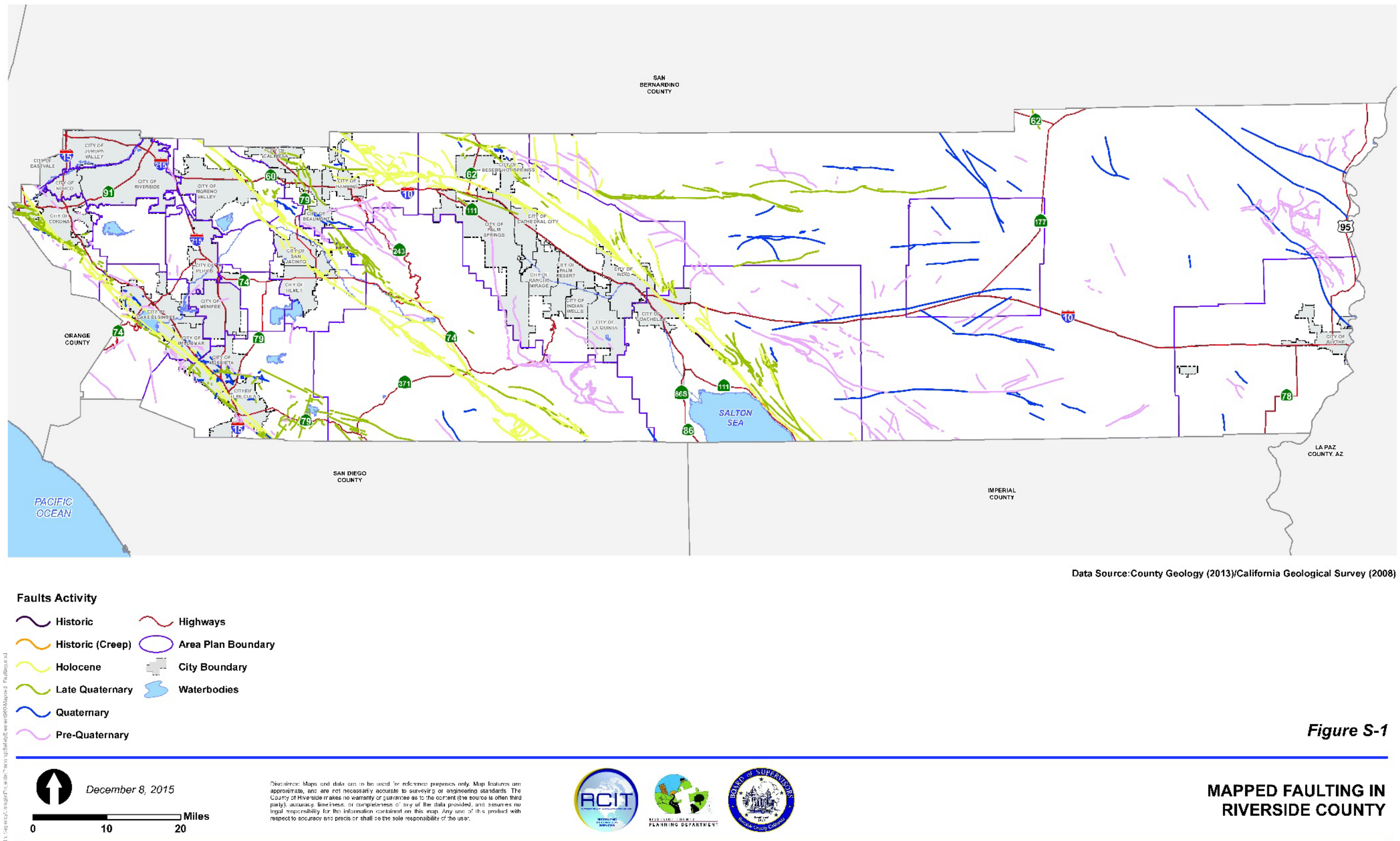
Earthquake risk is very high in the most heavily populated western portion of the County and the Coachella Valley, due to the presence of two of California's most active faults, the San Andreas and San Jacinto. The risk is moderate in the eastern portion of the County beyond the Coachella Valley.

The following maps have been provided by the Riverside County Transportation and Land Management Agency and developed using Cal OES MyPlan.

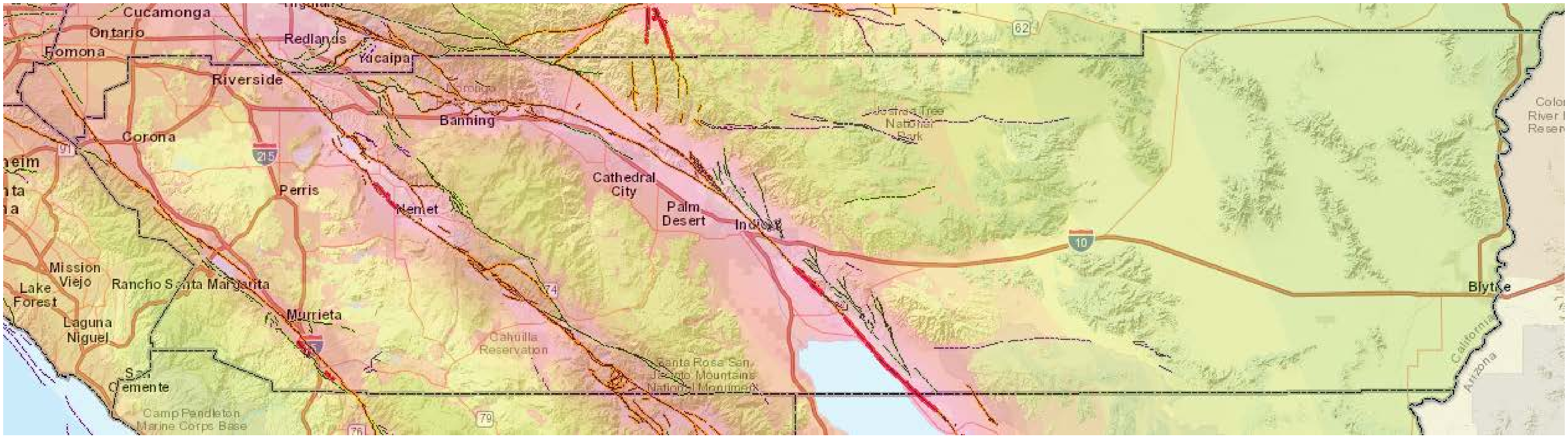
Map 2: Riverside County Faults and Zones



Map 3: Fault Activity



Map 4: Ground Shaking Potential



Relationship to Other Hazards – Cascading Effects

Earthquakes can cause many cascading effects such as fires, flooding, hazardous material spills, utility disruptions, landslides, transportation emergencies, electrical failure and the possible failure of several dams in Riverside County.

Hazus Assessment

HAZUS®MH was used to generate general building stock and essential facility loss estimates for five different natural hazard scenarios. Two of the scenarios were large scenario earthquakes. The earthquakes chosen for analysis were an M6.8 Elsinore Fault Scenario Earthquake, and the M7.8 "ShakeOut" Scenario Earthquake on the Southern San Andreas Fault.

Risk assessment results were generated using the following HAZUS®MH analysis options:

- **General Buildings**
  - Ground Motion
  - Damage State Probabilities
  - Damage
  - Direct Economic Loss
- **Essential Facilities**
  - Medical Care
  - Police Stations
  - Fire Stations
  - Emergency Response
  - Schools
- **Transportation Systems**
  - Highways
  - Railways
  - Light Rail
  - Bus System
  - Port and Harbor
  - Ferry System
  - Airport Transportation
- **Utility Systems**
  - Potable Water
  - Waste Water
  - Oil
  - Natural Gas

    - Electric Power
    - Communication
- **Induced Physical Damage**
    - Fire following
    - Debris
- **Direct Social Losses**
    - Casualties
    - Shelter

Table 18 (ES-2) provides a summary of HAZUS®MH-estimated regional impacts for Riverside County for the two earthquake scenarios. As shown in the tables, the total estimated direct economic loss related to building damage ranges from $1.8B to $9.8B in the two scenario events. It should be noted that these totals are for Riverside County only. Both earthquake scenarios have the potential to cause additional damage in adjacent counties (for example, the Elsinore scenario would also significantly impact San Diego and Orange counties), whose losses are not tabulated here.

Table 15: Summary of HAZUS estimated Impacts on Riverside County for Two Earthquake Scenarios

Table ES-2. Summary of HAZUS®MH-estimated Impacts on Riverside County for Two Earthquake Scenarios

Impact Category	M6.8Elsinore	M7.8"ShakeOut" San Andreas*
Economic Loss due to Building Damage Total Building-related Direct Economic Loss	$1.2B $1.8B	$6.9 B $9.8 B
# Buildings in Complete Damage State	100	25,000* (many MH)
Debris Generated (million tons)	0.3	3.5
Displaced Households People Needing Short-term Shelter	110 Households 90 People	19,000 Households* 8,600 People*
Fatalities (2 am, 2 pm, 5 pm) Total Injuries (2 am, 2 pm, 5 pm)	<10,<10,<10 200, 200, 220	60 bldg (70 all causes)* 11,600 bldg (11,900 all)*
% of Households without Water	<1%	99%
# Highway Bridges w/ at least Moderate Damage (potentially closed)	None expected	100

*Note: selected custom estimates for the "ShakeOut" scenario have been taken from the full USGS technical report, "*The ShakeOut Scenario*": http://pubs.usgs.gov/of/2008/1150

Table 19 summarizes expected essential facility performance in the two earthquake events. Estimated building damages to essential facilities in Riverside County ranges from about $64M - $351M. These loss totals should not be considered all-inclusive, as replacement cost data was not available for many hospitals, and a small number of schools and police facilities.

Table 16: Summary of HAZUS – estimated Impacts for Riverside County Essential Facilities in Two Earthquake Scenarios

Essential Facility	Category	M6.8 Elsinore		M7.8 "ShakeOut" San Andreas	
		Mean Damage	Economic Loss ($1,000)	Mean Damage	Economic Loss ($1,000)
Hospitals*	Medium	2%	$4,858	14%	$3,842
	Large	0%	$899	26%	$5,180
Schools	K-12 (default data)	1%	$2,375	2%	$3,708
	K-12 (providing data)	1%	$54,774	6%	$314,182
	CCD (providing data)	0%	$706	5%	$24,465
EOCs		1%	$3	6%	$20
Police Stations		0%	$3	7%	$35
Fire Stations		1%	$3	4%	$14
TOTALS			**$63,620**		**$351,446**

*Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 licensed acute care beds)

Elsinore Earthquake Scenario – Regional Impacts

The M6.8 Elsinore scenario earthquake will impact the western-most communities and infrastructure of Riverside County. A summary of regional impacts is provided in Figure 29. These impacts are described below.

Of the approximately 647,000 buildings modeled within the improved general building stock data for Riverside County, less than 1% (approximately 100) are expected to suffer "complete" damage in the Elsinore scenario earthquake. These buildings would be considered "red-tagged" or unsafe for continued occupancy. A small percentage of these buildings (15% or less) have the potential for collapse, suggesting the need for Urban

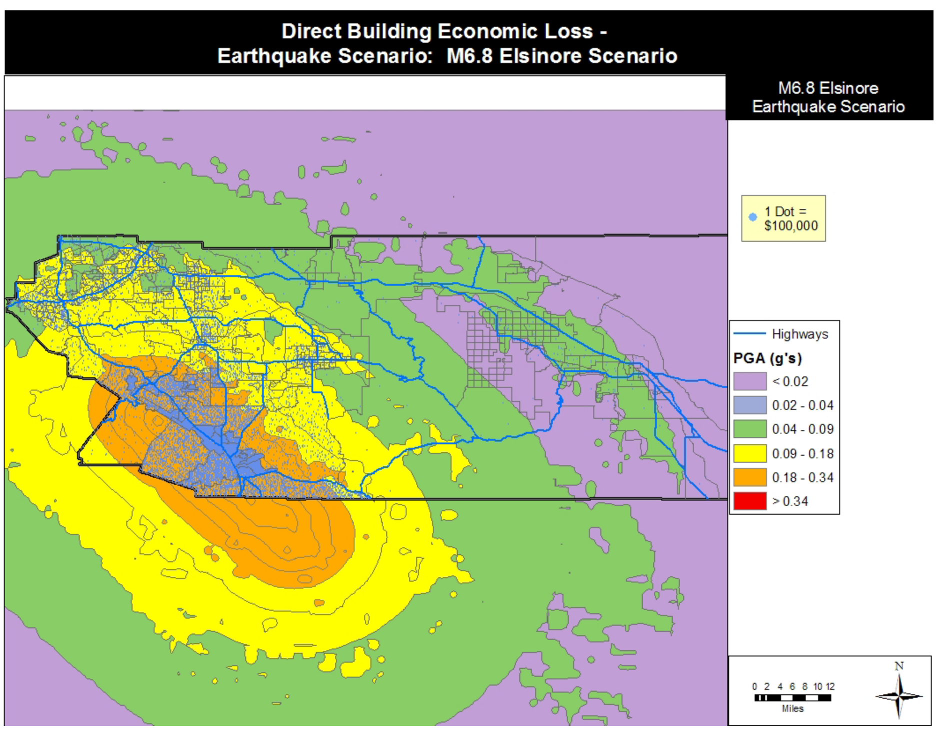
Search & Rescue (USAR). Approximately 2,200 buildings (0.3%) are expected to suffer "extensive" damage, and would be considered "yellow-tagged", with restrictions on continued use. While the remainder of buildings would be considered "green-tagged" (safe for occupancy, although some damage may have occurred), as many as 3% (20,500) would be expected to suffer "moderate" damage, and an additional 13% (82,700) would suffer "slight" damage.

As much as 0.3 million tons of debris may result from these damaged buildings – 47% is expected to be heavy debris (concrete and steel), requiring heavy equipment to break down and remove, while 53% is expected to be light debris (wood, brick and other debris).

The number of people killed as a result of shaking-induced and transportation system damage is expected to be less than 10, regardless of the time of day that the earthquake occurs.

Total injuries, including the range of injuries from minor injuries treated with basic medical care to mortal injuries (deaths), are expected to be on the order of 200-220. Transportation of the injured for treatment is not expected to be impacted by transportation system damage, as no bridge in the County is expected to suffer "moderate" damage or greater.

Figure 30: Direct Building Economic Loss



"ShakeOut" San Andreas Earthquake Scenario Regional Impacts

The M7.8 "ShakeOut" San Andreas scenario earthquake will impact most of the populated portions of Riverside County. A summary of impacts is provided in Table 19. It should be noted, however, that some impact estimates have been taken from the improved estimates developed by the extensive community modeling effort (Jones, et al., 2008) conducted for the "ShakeOut" exercise. The use of these estimates is noted where appropriate.

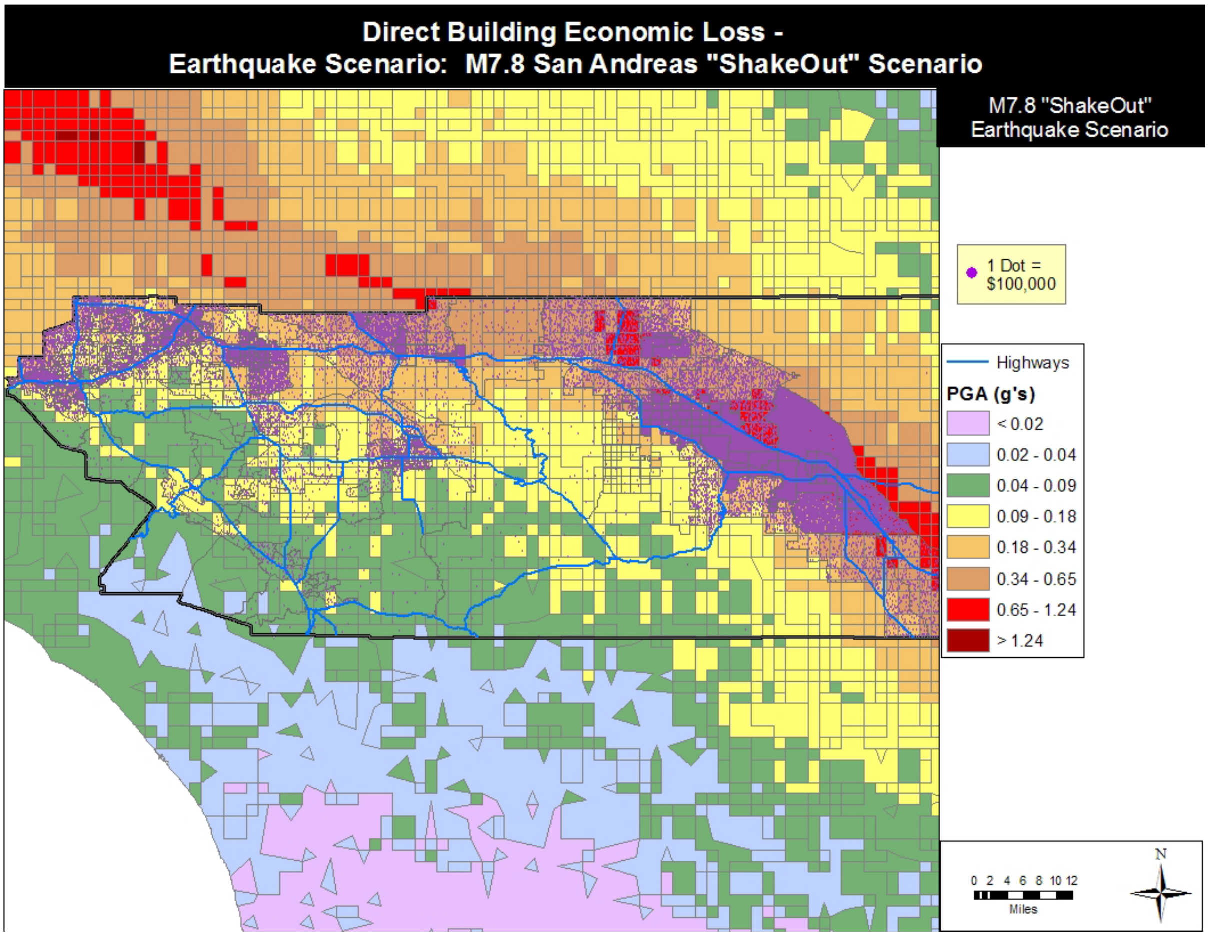
Table 17: Summary of HAZUS – Estimated Impacts for Riverside County Due to an M7.8 Scenario Earthquake on the "ShakeOut" San Andreas Fault

Economic Loss due to Building Damage Total Building-related Direct Economic Loss	$6.9 B $9.8 B
# Buildings in Complete Damage State	25,000* (many MH)
Debris Generated (million tons)	3.5
Displaced Households People Needing Short-term Shelter	19,000 Households* 8,600 People*
Fatalities (2 am, 2 pm, 5 pm) Total Injuries (2 am, 2 pm, 5 pm)	60 in buildings (70 all causes)* 11,600 in buildings (11,900 all)*
% of Households without Water	99%
# Highway Bridges w/ at least Moderate Damage (potentially closed)	100

*Note: selected custom estimates for the "ShakeOut" scenario have been taken from: http://pubs.usgs.gov/of/2008/1150

In the M7.8 "ShakeOut" Scenario earthquake on the San Andreas Fault, dollar losses related to shaking-induced building damage are estimated to reach $6.9 billion, while total direct economic losses are expected to be approximately $9.8 billion. The geographic distribution of total direct economic loss is mapped in Figure 4-9.

Figure 31: Direct Economic Loss in Riverside County Resulting from an M7.8 Scenario Earthquake on the “ShakeOut” San Andreas Fault



According to the published “ShakeOut” scenario (Jones, et al., 2008), approximately 25,000 buildings would be expected to suffer “Complete” damage in the scenario earthquake. These building, predominantly residential mobile homes, would be considered “red-tagged” or unsafe for continued occupancy. A small percentage of these buildings (15% or less) have the potential for collapse, suggesting the need for Urban Search & Rescue. More than 18,000 buildings are expected to suffer “Extensive” damage in this scenario earthquake and would be considered “yellow-tagged”, with restrictions on continued use. While the remainder of buildings would be considered “green-tagged” (safe for occupancy, although some damage may have occurred), approximately 63,000 would be expected to suffer “Moderate” damage, and an additional 137,000 would suffer “Slight” damage.

Almost 3.5 million tons of debris may result from these damaged buildings – 58% is expected to be heavy debris (concrete and steel), requiring heavy equipment to break down and remove, while 42% is expected to be light debris (wood, brick and other debris).

In the "ShakeOut" scenario (Jones, et al., 2008), damage to single family and multi-family dwellings is expected to result in the displacement of approximately 19,000 households. Immediately after the earthquake, significant disruption to the water supply and distribution system is expected, essentially impacting the entire county. While many of the displaced may find shelter with friends and family, or in available hotels, approximately 8,600 people are expected to seek public shelter.

The number of people killed as a result of shaking-induced building, transportation system damage, and post-earthquake fire may be on the order of 60 to 70 people. Total injuries, including the range of injuries from minor injuries treated with basic medical care to mortal injuries (deaths) from all causes, are estimated to reach 11,900 within the County.

Transportation of the injured for treatment could be impacted by transportation system damage with as many as 100 bridges in the County suffering at least "Moderate" damage.

Essential Facility Impacts

Table 19 provides an overview of essential facility performance in the "ShakeOut" San Andreas Scenario earthquake. The table lists the number of essential facility sites and buildings (these numbers will differ for multi-building campuses, such as schools and hospitals). The table also provides the total building replacement value and the number of buildings for which value data was available. As can be seen in the table, replacement cost data for hospitals was generally not available, unlike most other essential facility types. Expected building performance in this earthquake event is on the order of 7% damage or less for EOCs, fire stations, police stations, and schools, but as much as 26% damage for large hospitals. The total economic loss for essential facilities has been estimated to exceed $351 million, with 97% of the total loss occurring in schools. It should be noted that although cost data is only available for 31 hospital buildings (out of 77), these 31 buildings suffer more than $9 million in loss, indicating that the actual total economic loss for hospitals would be significant, but can't be estimated at this time because of the lack of replacement value data.

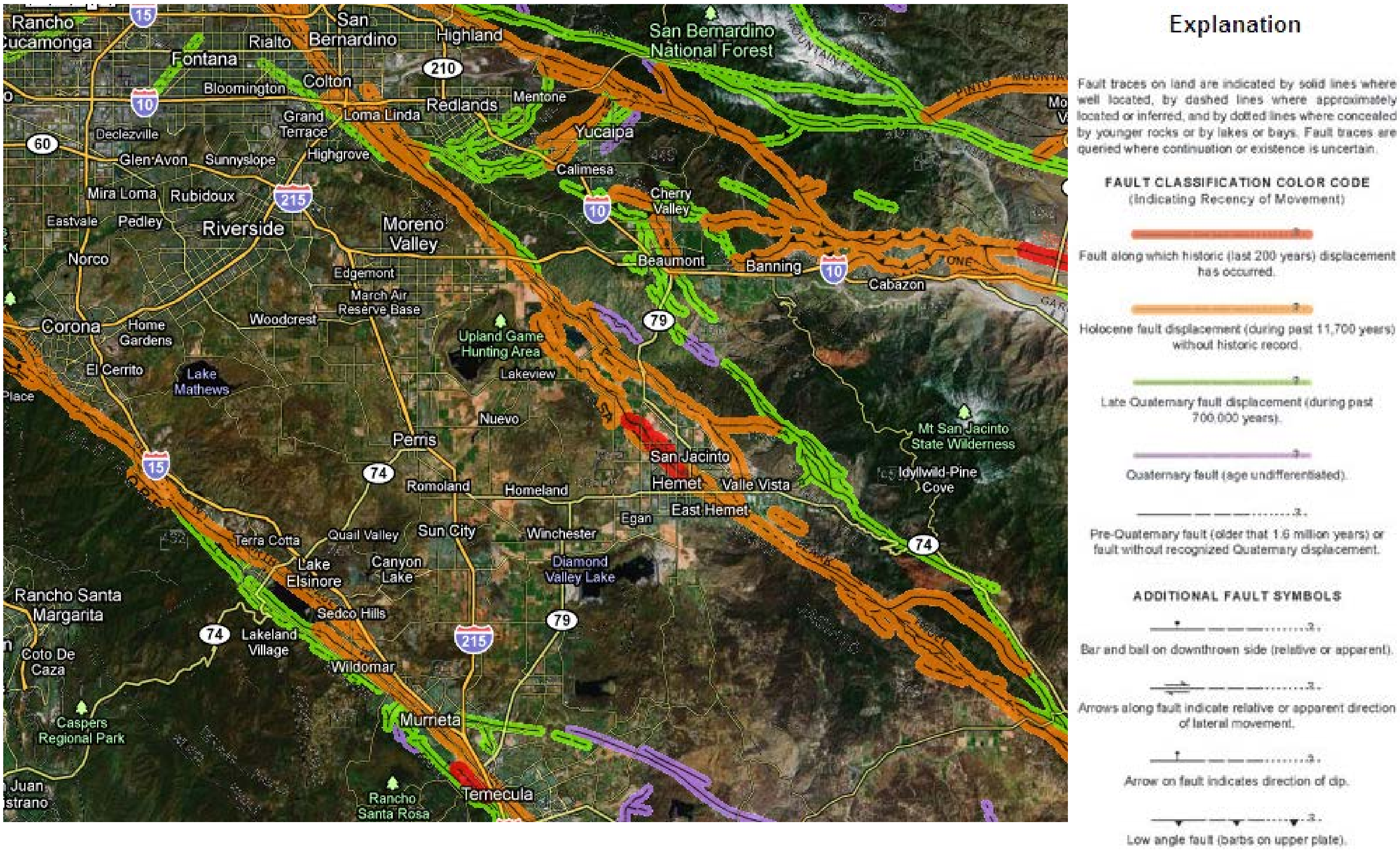
Table 18: Riverside County Essential Facility Loss Estimates – M7.8 "ShakeOut" San Andreas Fault Scenario Earthquake

Essential Facility	Category	No. of Facilities/ Sites	No. of Buildings	No. of Beds	Replacement Cost ($1,000)	# Buildings w/ replacement cost data	Functionality Day 1 (%)	Mean Damage	Economic Loss ($1,000)
Hospitals*	Medium	8	28	793	$162,827	21	64	14%	$3,842
	Large	8	49	2,467	$200,792	10	26	26%	$5,180
Schools	K-12 (default data)	152	152		$219,600	152	74	2%	$3,708
	K-12 (providing data)	689	9,981		$6,049,534	9,213	64	6%	$314,182
	CCD (providing data)	12	258		$356,708	257	54	5%	$24,465
EOCs		43	43		$310,273	43	60	6%	$20
Police Stations		51	51		$675,299	48	57	7%	$35
Fire Stations		156	156		$366,493	156	72	4%	$14
TOTALS		**1,119**	**10,718**	**3,260**	**$8,341,525**	**9,900**			**$351,446**

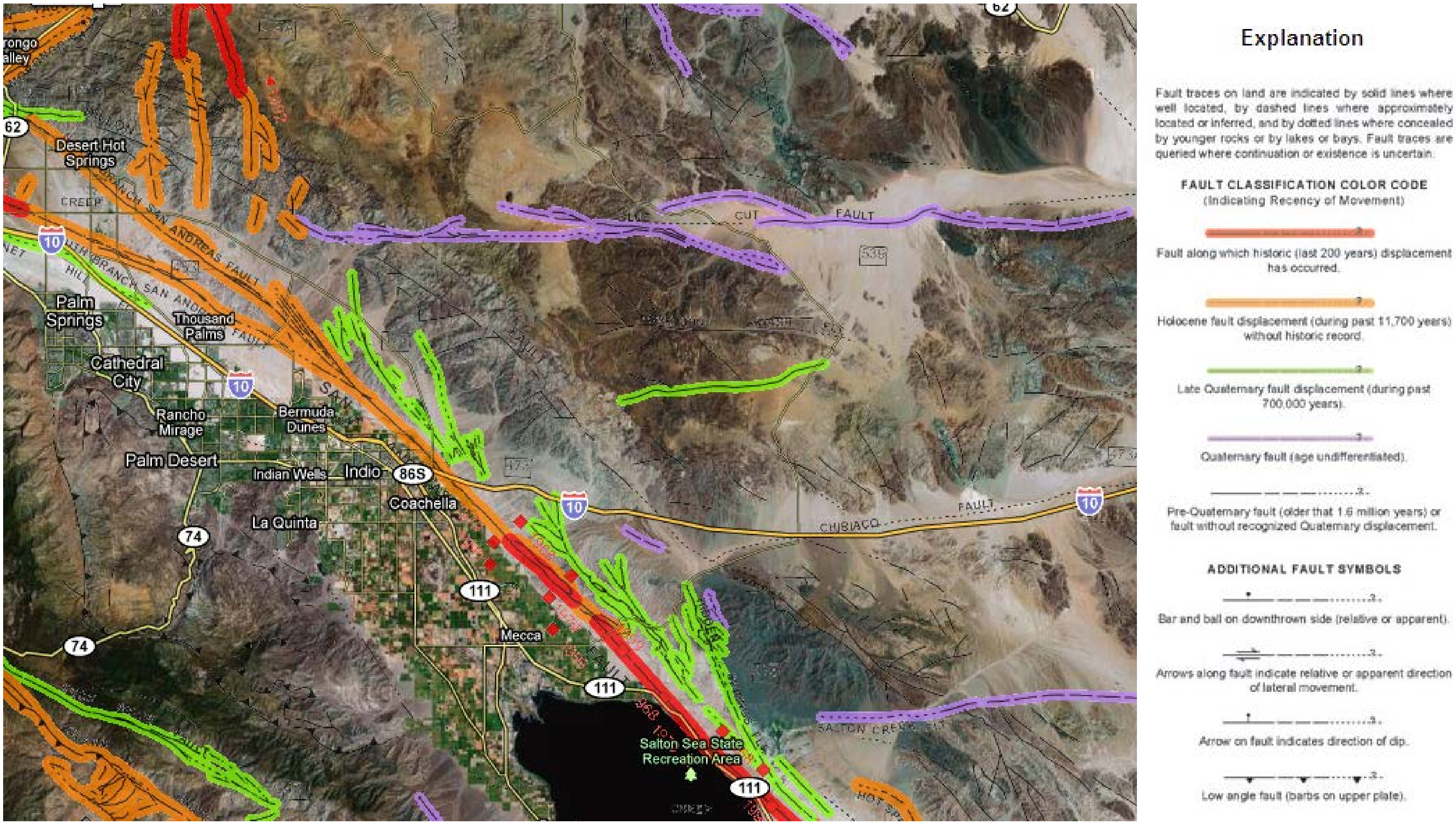
*Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 licensed acute care beds)

The following three maps are from the Fault Activity Map of California, California Geologic Survey, Data Map

Map 5: Fault Activity Map of California, Western Riverside County



Map 6: Fault Activity Map of California, Central Riverside County



Map 7: Fault Activity Map of California, Eastern Riverside County

Appendix T

Bedford-Coldwater Groundwater Sustainability Plan

BEDFORD COLDWATER
Groundwater Sustainability Authority

DRAFT GROUNDWATER SUSTAINABILITY PLAN
BEDFORD-COLDWATER BASIN

| MAY 2021 |

Stantec

TODD GROUNDWATER

H&H WATER RESOURCES

BEDFORD COLDWATER
Groundwater Sustainability Authority

DRAFT GROUNDWATER SUSTAINABILITY PLAN

BEDFORD COLDWATER BASIN

May 2021

TODD GROUNDWATER

Stantec H&H WATER RESOURCES

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Appendices (following text)

Appendix A – Joint Powers Agreement forming the Bedford-Coldwater Groundwater Sustainability Agency

Appendix B – Bedford-Coldwater GSA Notice of Decision to become a Groundwater Sustainability Agency

Appendix C – GSP Elements Guide

Appendix D – BCGSA Stakeholder Outreach Plan

Appendix E – Bedford-Coldwater GSP Numerical Groundwater Model Documentation Report

Appendix F – Baseline Water Quality Sampling Results

Appendix G – Management Areas Designated in the Bedford Coldwater Subbasin to be Included in the Groundwater Sustainability Plan

Appendix H – Detailed Annual Surface and Groundwater Budgets

Appendix I – Bedford-Coldwater GSP Data Management System Description

Acronyms

Actions	Management Actions
AF	acre-feet
AFY	acre-foot per year
Agreement	Joint Powers Agreement forming the BCGSA
Basin Plan	Water Quality Control Plan for the Santa Ana River Basin
Basin	Bedford-Coldwater Subbasin
BCGSA	Bedford-Coldwater Groundwater Sustainability Agency
bgs	below ground surface
Board	BCGSA Board of Directors
CASGEM	California Statewide Groundwater Elevation Monitoring
CCED	California Conservation Easement Database
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
cfs	cubic feet per second

CIMIS	California Irrigation Management Information System
COC	constituent of concern
Corona	City of Corona
DDW	Division of Drinking Water
DMS	Data Management System
DPR	Department of Pesticide Regulation
DWR	California Department of Water Resources
DWSAP	Drinking Water Source Water Assessment Program
EMWD	Eastern Municipal Water District
ET	evapotranspiration
ET_0	reference evapotranspiration
EVMWD	Elsinore Valley Municipal Water District
FMMP	Farmland Mapping and Monitoring Program
ft	feet
GAMA	Groundwater Ambient Monitoring and Assessment
GDE	groundwater dependent ecosystem
GIS	geographic information system
GMZs	groundwater management zones
GPS	Global Positioning System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWMP	Groundwater Management Plan
in/yr	inches per year
InSAR	Interferometric Synthetic Aperture Radar
IRWMP	Integrated Regional Water Management Plan
JPA	Joint Powers Authority
km^2	square kilometers
M&I	municipal, commercial, and industrial
MA	Management Area
MCL	Maximum Contaminant Level
Metropolitan	Metropolitan Water District of Southern California
mg/L	milligrams per liter
mi^2	square miles
MO	Measurable Objective
MODFLOW	United States Geological Survey modular finite-difference flow model
MSHCP	Western Riverside County Multiple Species Habitat Conservation Plan
msl	mean sea level
MT	Minimum Threshold
NAD83	North American Datum of 1983
NAVD88	North American Vertical Datum of 1988
NCCAG	Natural Communities Commonly Associated with Groundwater

NCED	National Conservation Easement Database
NDMI	normalized difference moisture index
NDVI	normalized difference vegetation index
NED	National Elevation Dataset
ng/L	nanograms per liter
NO_3	nitrate
NOAA	National Oceanic and Atmospheric Administration
NPS	nonpoint source
NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
NTU	nephelometric turbidity unit
NWIS	National Water Information System
ORP	oxidation-reduction potential
OWTS	on-site wastewater treatment system
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
ppt	parts per trillion
Projects	projects to support sustainability
QA/QC	quality assurance and quality control
RCRCD	Riverside County Resource Conservation District
RFP	Request for Proposal
RWQCB	Santa Ana Regional Water Quality Control Board
SARHCP	Upper Santa Ana River Habitat Conservation Plan
SCADA	Supervisory Control and Data Acquisition
SFR	Streamflow Routing Package
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SMCL	Secondary Maximum Contaminant Level
SMP	Surface Mining Permit
SNMP	Salt and Nutrient Management Plan
SSURGO	Soil Survey Geographic Database
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TNC	The Nature Conservancy
TVWD	Temescal Valley Water District
USDA	United States Department of Agriculture
USGS	United States Geological Survey
UTV	Upper Temescal Valley
UWMP	Urban Water Management Plan
WMWD	Western Municipal Water District
WRF	Water Reclamation Facility

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EXECUTIVE SUMMARY

The Sustainable Groundwater Management Act (SGMA) requires local agencies in groundwater basins designated as high- or medium-priority to form Groundwater Sustainability Agencies (GSAs) and develop a Groundwater Sustainability Plan (GSP) to plan for achieving and/or maintaining sustainability within 20 years of implementing the plan. The Bedford-Coldwater Groundwater Subbasin (Basin) has been designated by the California Department of Water Resources (DWR) as very low-priority, so the preparation of a GSP is not required. However, the City of Corona (Corona), Temescal Valley Water District (TVWD), and Elsinore Valley Municipal Water District (EVMWD), the three major water purveyors and groundwater users in the Basin, are committed to protecting and maintaining sustainable groundwater conditions in the Basin into the future.

The three agencies signed a Joint Powers Agreement (Agreement) creating a Joint Powers Authority (JPA) and forming the Bedford-Coldwater Groundwater Sustainability Agency (BCGSA). The BCGSA has volunteered to become the GSA for the Bain and prepare and implement this GSP.

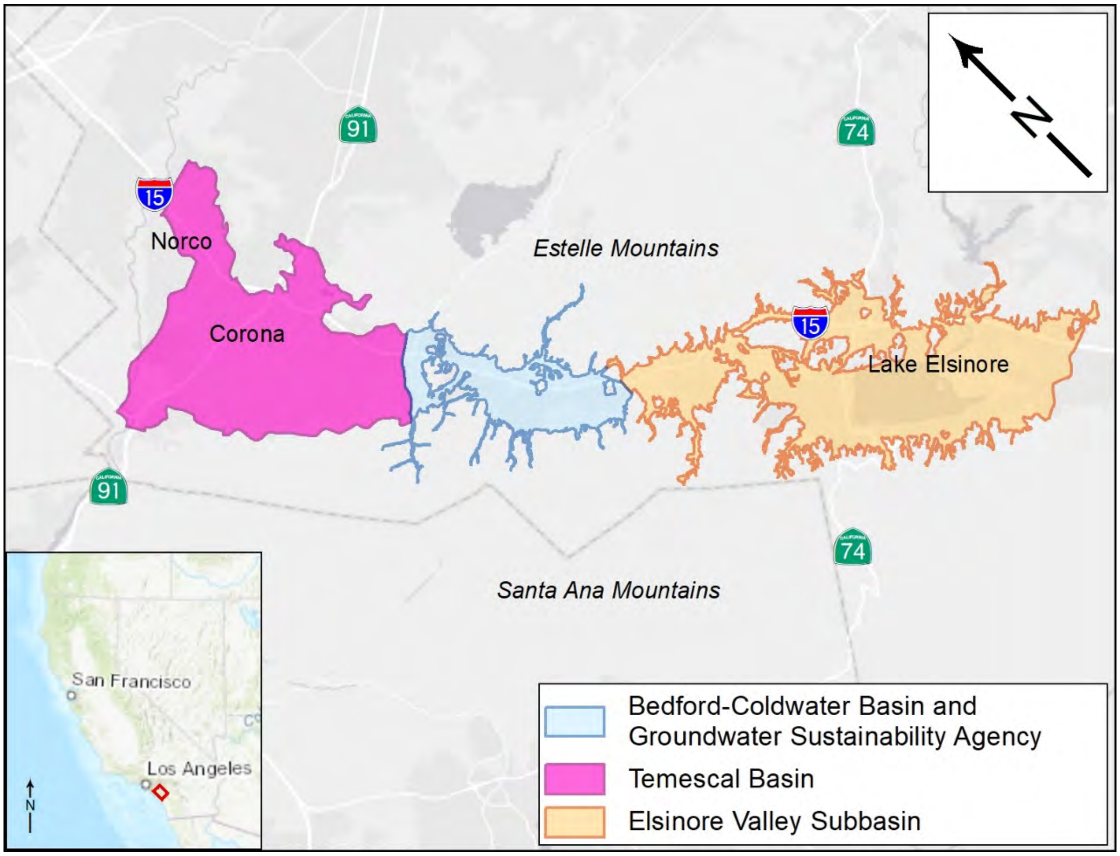
BASIN SETTING

Figure ES-1 shows the Basin located in western Riverside County. **Figure ES-1** also shows the adjacent Temescal Basin to the northwest and Elsinore Valley Subbasin to the south. The Basin is bound on the east and west by consolidated rocks of Estelle Mountain and the Santa Ana Mountains, respectively.

The Bedford-Coldwater Basin is composed of alluvial fan, alluvial valley, axial channel, and wash deposits. These deposits are sourced from the Santa Ana Mountains to the west of the Basin and the Peninsular Ranges to the east of the Basin. The alluvial fan deposits in the Coldwater area extend into the Bedford area and have been disrupted by faulting. Channel deposits along Temescal Wash and local tributaries define the eastern boundary of the Basin. In the northern Bedford area, a variety of Tertiary sedimentary units crop out and the character of these deposits and the groundwater chemistry differs from the alluvial fans to the north in the Temescal Subbasin and those to the south in the Elsinore Groundwater Basin.

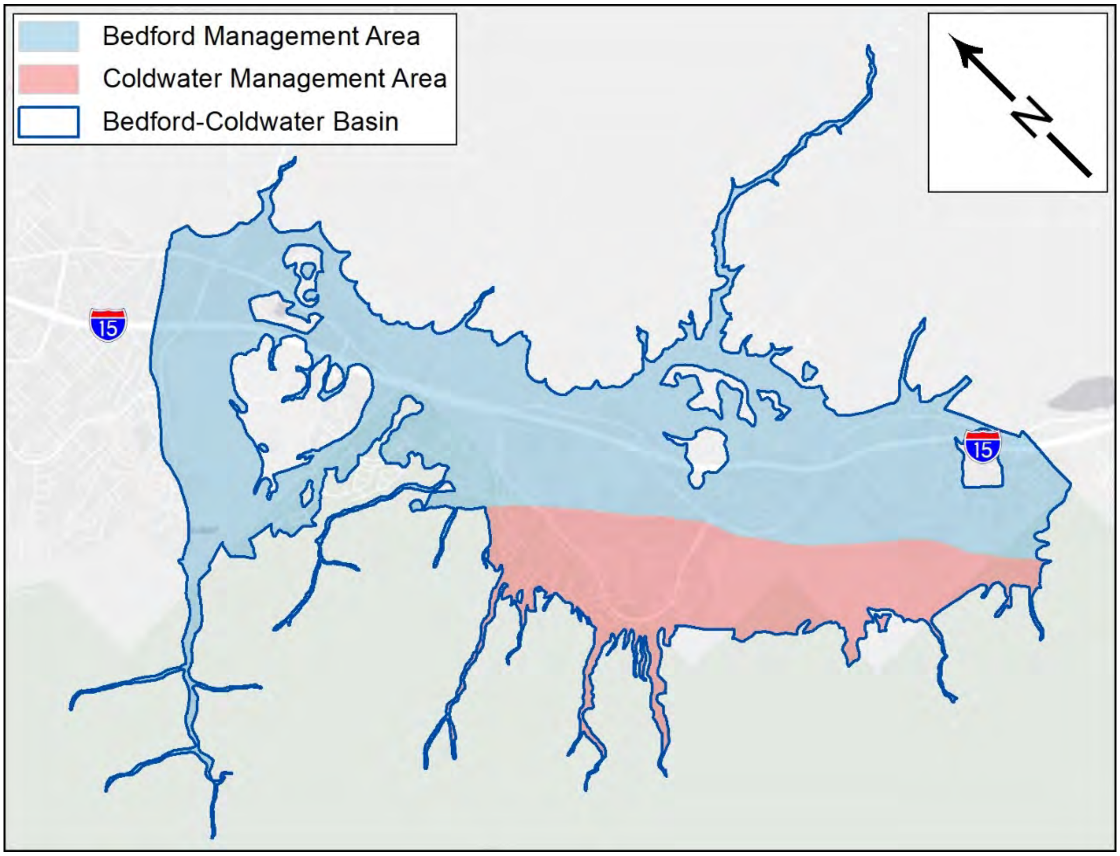
These deposits vary in depth from less than 40 feet up to 500 feet in the Bedford area (eastern portion of the Basin) and up to 800 feet in thickness in the deepest portions of the Coldwater area (western portion of the Basin).

Figure ES-1. Bedford-Coldwater Basin



The Basin is divided into two Management Areas (MAs) designed to facilitate analysis, management, and implementation of the GSP. The MAs are shown on **Figure ES-2**. The Bedford MA occupies roughly the eastern two-thirds of the Basin. It is separated from the Coldwater MA by the Glen Ivy Fault, which is a partial barrier to groundwater flow. The Coldwater MA is the part of the Basin west of the Glen Ivy Fault. Because of downward movement on that side of the fault, Basin thickness is much greater than in the Bedford MA.

Figure ES-2. Bedford-Coldwater Basin Management Areas



GROUNDWATER CONDITIONS

Basin groundwater elevations have been relatively stable in recent years. Groundwater elevations in the northern portion of the Bedford MA show a slight decrease during the 2013 through 2015 drought but have begun to recover. Groundwater elevations in the Coldwater MA declined over the last 24 years with significant fluctuations in response to wet and dry cycles. Water levels in the Coldwater area have varied more than 350 feet during this period and there have been multiple major and minor cycles of groundwater elevation decline and recovery. The wide water level fluctuations over time in the Coldwater area likely reflect the relatively small footprint and fault-controlled flow along with the fact that most of the pumping in the Basin occurs in this area. Although long-term declines in groundwater elevations have occurred in Coldwater in the past, recent groundwater elevations have stabilized due in part to shared management of the Basin between the BCGSA agencies.

Total Dissolved Solids (TDS) and nitrate are the primary constituents of concern in the Basin. TDS concentrations are relatively low in the Coldwater MA, naturally higher in Bedford MA, and generally increase downstream. Groundwater in the Basin has been impacted by human activities in the Basin and watershed including agricultural, urban, and industrial land uses.

Nitrate has historically been the most significant constituent of concern in the Basin. Water quality in the Basin is generally within drinking water standards.

WATER SUPPLY

Sources of water supply for agricultural, Municipal and Industrial (M&I), and domestic uses include groundwater, imported water, and recycled water. Metropolitan Water District of Southern California (Metropolitan) is the wholesaler for imported water and its sources of water include the Colorado River and the State Water Project. Both Corona and TVWD receive imported water from Metropolitan for distribution in the Basin. EVMWD also receives imported water from Metropolitan through Western Municipal Water District (WMWD), but only distributes imported water within the Basin when groundwater supply to customers is insufficient.

Groundwater has been an important component of water supply in the Basin for more than 100 years. Until the 1970s, most of the groundwater production in the Basin was for agricultural supply. A few well owners have also produced small amounts of groundwater for domestic use. Production for municipal supply increased in the 1960s and 1970s and continues today.

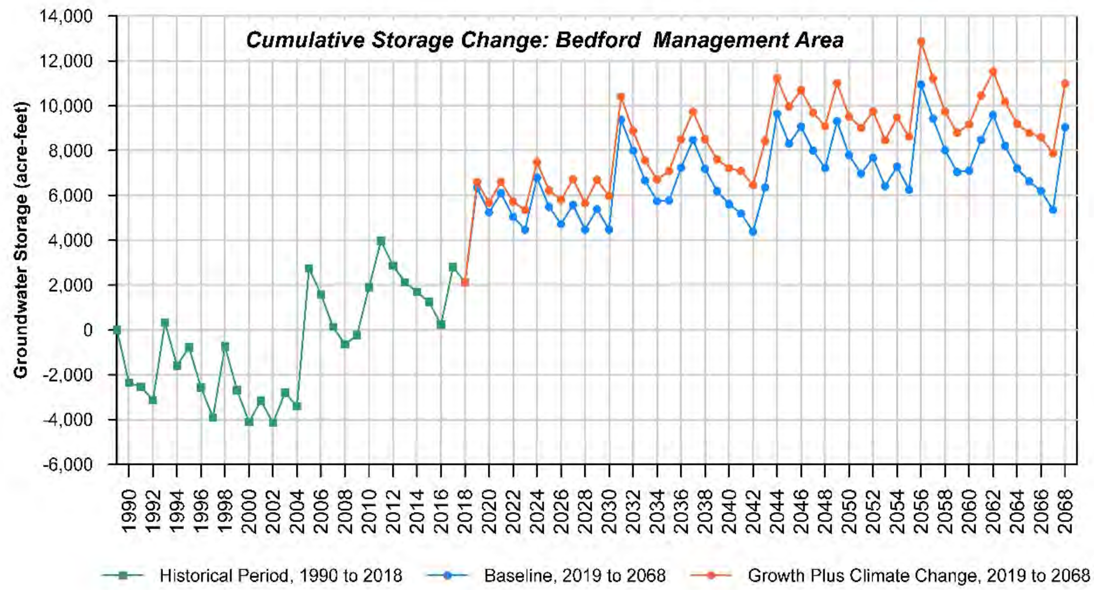
For more than 50 years, Corona, EVMWD, and TVWD have relied on groundwater from the Basin for municipal uses, and these agencies have long been responsible for managing groundwater conditions in the Basin. Corona and EVMWD have legal agreements for the management of withdrawals from the Coldwater portion of the Basin. Additionally, Corona, in coordination with TVWD, adopted a Groundwater Management Plan (GWMP) in 2008 that covers the Basin.

WATER BUDGET

A water balance (or water budget) is a quantitative tabulation of all inflows, outflows, and storage change of a hydrologic system. This GSP contains a detailed water balance for both the groundwater system and surface water system of the Basin. The water budgets were developed for time periods representing historical, current, future no project (baseline), and future growth plus climate change (growth plus climate change) conditions.

In the Bedford MA, the major inflow to the groundwater budget is percolation from streams, especially during wet years. In recent years (2012 to 2018), reclaimed water percolation has become another major inflow. The major outflows include M&I pumping and groundwater discharge to streams. Historically, agricultural pumping also contributed to outflow from the Basin, but this decreased to a negligible amount by 2007. Groundwater storage in the Bedford MA increased slightly during the historical period (**Figure ES-3**), primarily as a result of the decrease in total groundwater pumping. Outflows in the future scenarios (baseline and growth plus climate change) are predicted to increase in response to increased pumping. However, as shown in **Figure ES-3**, the Basin is still expected to have a positive change in storage (more inflow than outflow) in the future, even in growth and climate change projections. This future increase in storage is due to continued groundwater management and increased imported water use in the Basin.

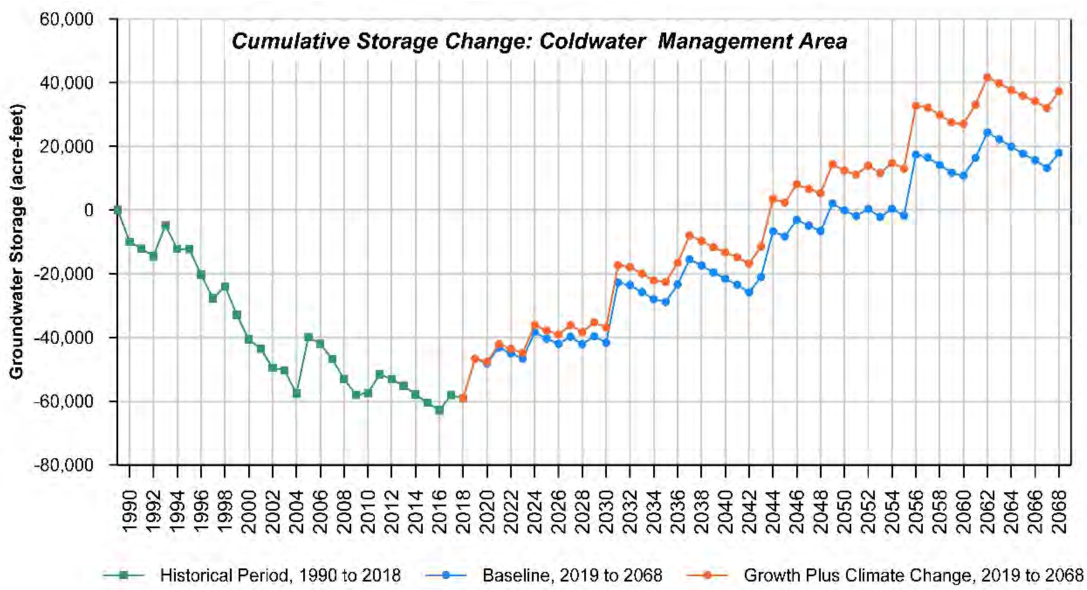
Figure ES-3. Cumulative Storage Change: Bedford Management Area



In the Coldwater MA, percolation from streams occurs as infrequent, episodic events; stream percolation can range from 15,000 acre-feet (AF) in wet years to zero in dry years. M&I pumping has dominated outflows in this MA, although it has decreased from its peak in the late 1990s. Similar to the Bedford MA, agricultural pumping was a significant outflow historically, but decreased to a negligible amount by 2001.

Estimated historical storage in the Coldwater MA declined by a cumulative total of 60,000 AF from 1990 to 2004, as shown in **Figure ES-4**. EVMWD and Corona entered into an agreement to limit pumping in the MA to a periodically re-calculated safe or sustainable yield in 2008. As a result, there was little additional cumulative decline from 2005 to 2018. In contrast, storage in both future scenarios is predicted to increase steadily over the 50 year future simulation periods. Inflows are estimated to exceed outflows in the future because of increased urban recharge and continued limitation of pumping. The rate of storage increase is slightly higher under the growth plus climate change scenario relative to the baseline scenario, which can be attributed to increased urban return flow recharge.

Figure ES-4. Cumulative Storage Change: Coldwater Management Area



SUSTAINABLE MANAGEMENT CRITERIA (SMC)

This GSP defines sustainable management as the use and management of groundwater in a manner that can be maintained without causing *undesirable results*, which are defined as significant and unreasonable effects caused by groundwater conditions occurring throughout the Basin, specifically in consideration of the following sustainability indicators:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply.
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion. [1]
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

For these sustainability indicators, a GSP must develop quantitative sustainability criteria that allow the GSA to define, measure, and track sustainable management. These criteria include the following:

[1] Seawater intrusion is noted, but no risk of seawater intrusion exists in this inland basin.

- Undesirable Result – significant and unreasonable conditions for any of the six sustainability indicators.
- Minimum Threshold (MT) – numeric value used to define undesirable results for each sustainability indicator.
- Measurable Objective (MO) – specific, quantifiable goal to track the performance of sustainable management.

The sustainability indicators and SMC are clearly defined and provide a quantitative analysis of the Basin's sustainability. As the Basin is currently sustainable, and has been managed sustainably, the following sustainability criteria are defined in to avoid future undesirable results:

- The Minimum Threshold for defining undesirable results relative to chronic lowering of groundwater levels is defined by operational considerations to maintain water levels at or above current pump intakes or screen bottoms (whichever is higher) in municipal water supply wells represented by frequently monitored Key Wells. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in two-thirds or more of the currently monitored wells in each Management Area.
- The Minimum Threshold for reduction of groundwater storage for all Management Areas is fulfilled by the minimum threshold for groundwater levels as proxy.
- The Minimum Threshold for land subsidence is defined as a cumulative decline equal to or greater than one foot of decline since 2015, which represents current conditions and the SGMA start date. This is equivalent to a rate of decline equal to or greater than 0.2 feet in any five-year period. The extent of cumulative subsidence across the Basin will be monitored and evaluated using Interferometric Synthetic Aperture Radar (InSAR) data available through the SGMA Data Viewer during the 5-year GSP updates. Subsidence as a result of groundwater elevation decline is closely linked to groundwater levels and it is unlikely that significant inelastic subsidence would occur if groundwater levels remain above their minimum thresholds.
- The Minimum Thresholds for degradation of water quality address nitrate and total dissolved solids (TDS) for the entire Basin.
    - The Nitrate Minimum Threshold (in both Management Areas) is defined as 5-year average concentrations of all monitored wells not exceeding the 10 milligrams per liter (mg/L) drinking water maximum contaminant level (MCL) for Nitrate as Nitrogen.
    - The TDS Minimum Threshold (in both Management Areas) is defined as the 5-year average concentrations not exceeding the 1,000 mg/L secondary MCL for TDS.
- The Minimum Threshold for depletion of interconnected surface water is the amount of depletion associated with the lowest water levels recorded during the 2010 to 2015 drought. Specifically, undesirable results would occur if more than half of monitored wells near Temescal Wash had static water levels lower than 35 feet below the adjacent riparian vegetation ground surface elevation for a period of more than one year.

MONITORING NETWORK

The monitoring network for GSP implementation has been established to document groundwater and related surface conditions as relevant to the sustainability indicators, MTs, and MOs. The components of the monitoring network are built from existing programs and will be carried out by the BCGSA.

The BCGSA has actively engaged in assessment and improvement of its monitoring network. This process has been intensified as part of the GSP, given the need to identify data gaps and to assess uncertainty in setting and tracking sustainability criteria. Monitoring improvements such as adding or replacing monitoring infrastructure are part of GSP implementation and will be reviewed and updated for each five-year GSP update.

PROJECTS AND MANAGEMENT ACTIONS

During the preparation of the GSP, the BCGSA identified five specific management actions (Actions) and three projects (Projects) to achieve the sustainability goal. The Actions are generally focused on data collection, storage and reporting of information necessary to monitor sustainability, and assessment of when Actions may be necessary (i.e., when MTs are approached or exceeded). The projects are generally designed to reduce uncertainty in areas where data gaps have been identified during development of the GSP. The Projects and Actions in the GSP are as follows:

- **Action 1** – Provide for Collection, Compilation, and Storage of Information Required for Annual Reports and Submit Annual Reports;
- **Action 2** – Routinely Record Groundwater Levels and Take Action if Necessary;
- **Action 3** – Monitor Selected Groundwater Quality Constituents and Coordinate with the Regional Water Quality Control Board as Appropriate;
- **Action 4** – Track Trends in Groundwater Levels near Temescal Wash and Take Action as Necessary;
- **Action 5** – Review Interferometric Synthetic Aperture Radar (InSAR) Data on the California Department of Water Resources (DWR) Dataviewer During 5-Year Updates;
- **Project 1** – Investigate Groundwater/Surface Water Interaction at Temescal Wash;
- **Project 2** – Initiate a Survey of Active Private Wells; and
- **Project 3** – Evaluation of the Effects of Aggregate Pits on Groundwater Flow and Quality.

The Projects and Actions will be implemented by a combination of existing resources from the three agencies within the plan area and contracted resources.

IMPLEMENTATION

The official adoption of the GSP by the BCGSA will initiate Plan implementation. After submittal of the GSP to DWR, and during the DWR review period, the BCGSA will continue to communicate with stakeholders via the BCGSA's website and begin implementing the projects and management actions described in this GSP. The Plan will be implemented to sustainably manage groundwater in the Basin under the authority of the BCGSA and its member agencies.

The BCGSA is required to submit an annual report to DWR by April 1st of each year following adoption of the GSP. The first annual report will be due in April of 2022. The BCGSA has committed to implementing the GSP upon adoption and completing the projects and management actions necessary to monitor and maintain sustainability within the first 5 years of initiation of the GSP.

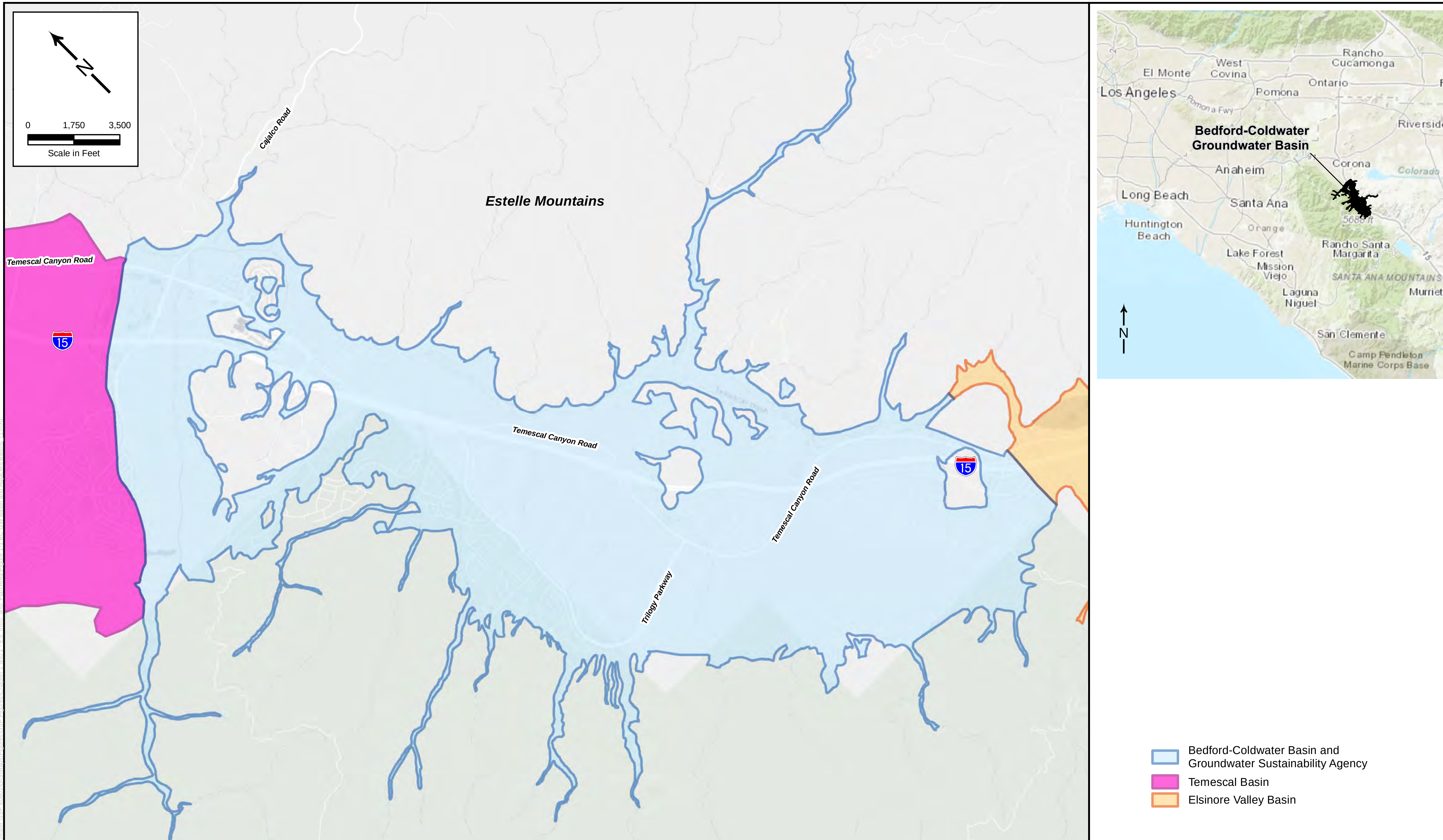
1. INTRODUCTION

The Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, was enacted in California to regulate and sustainably manage groundwater basins throughout the state. SGMA provides a framework to guide local public agencies and newly created Groundwater Sustainability Agencies (GSAs) in the management of their underlying groundwater basins, especially those considered critically affected as defined by the Department of Water Resources (DWR). The Bedford-Coldwater Groundwater Sustainability Agency (BCGSA) has elected to create a Groundwater Sustainability Plan (GSP) to maintain long-term groundwater sustainability in the Bedford-Coldwater Groundwater Subbasin (Basin, **Figure 1-1**) of the Elsinore Groundwater Basin.

1.1. PURPOSE OF THE GROUNDWATER SUSTAINABILITY PLAN

SGMA requires local agencies of all basins designated as high- or medium-priority to develop a GSP to halt groundwater overdraft and achieve sustainability within 20 years of implementing the plan. Although the Basin is designated as very low-priority and does not require a GSP, the BCGSA is committed to protecting and maintaining the current sustainable conditions into the future and has opted to create and implement a GSP.

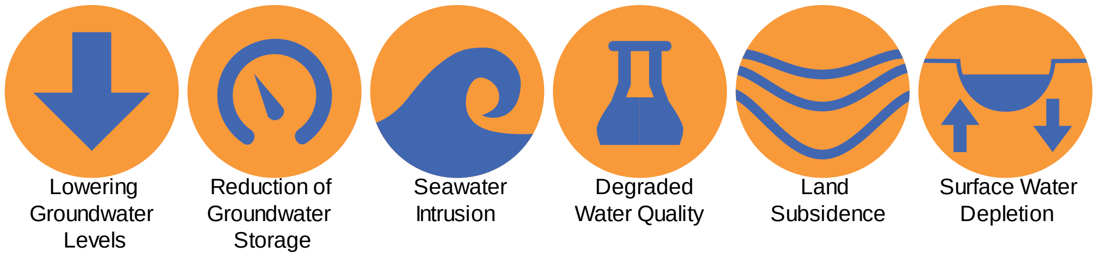
The purpose of the GSP is to provide basic information on the groundwater conditions in the Basin and to provide a plan or roadmap to maintain sustainability of beneficial use of groundwater in accordance with SGMA. The goal of the GSP is to promote Basin health by maintaining the generally balanced water budget, continue to prevent chronic overdraft, and avoid undesirable results which SGMA has divided into the six categories, represented in **Figure 1-2** below.



TODD GROUNDWATER

Figure 1-1
Bedford-Coldwater Groundwater Basin, GSA, and Adjacent Basins

Figure 1-2. SGMA Undesirable Results



The GSP assesses sustainability related to each of the categories listed above, defines thresholds for maintaining sustainability, outlines groundwater monitoring protocols, best management practices, management actions and projects designed to improve monitoring capabilities and/or to protect and enhance groundwater conditions. The GSP also includes a schedule and cost estimate for plan implementation. Each element of the GSP is designed to promote basin health and achieve and maintain the sustainability goal established for the Basin by the BCGSA.

1.2. SUSTAINABILITY GOAL

The BCGSA prepared this GSP with the goal of sustaining groundwater resources for the current and future beneficial uses of the Bedford-Coldwater Basin in a manner that is adaptive and responsive to the following objectives:

- Provide a long-term, reliable and efficient groundwater supply for municipal, industrial, and other uses;
- Provide reliable storage for water supply resilience during droughts and shortages;
- Protect groundwater quality;
- Support beneficial uses of interconnected surface waters; and
- Support integrated and cooperative water resource management.

This goal is consistent with SGMA and is based on information from the Plan Area, Hydrogeologic Conceptual Model, Groundwater Conditions, and Water Budget sections of this GSP that:

- Identify beneficial uses of Basin groundwater and document the roles of local water and land use agencies;
- Describe the local hydrogeologic setting, groundwater quality conditions, groundwater levels and storage, and inflows and outflows of the Basin; and
- Document the ongoing water resource monitoring and conjunctive management of groundwater, local surface water, recycled water and especially imported water sources that help protect groundwater quality and maintain water supply.

1.3. AGENCY INFORMATION

This section provides contact information, management structure, and legal authority of the BCGSA.

BCGSA Mailing Address: Bedford-Coldwater Groundwater Sustainability Authority
31315 Chaney Street
Lake Elsinore, CA 92530

1.3.1. Organization and Management Structure

The BCGSA consists of representatives from the three agencies overlying the Basin: The City of Corona (Corona), Elsinore Valley Municipal Water District (EVMWD), and Temescal Valley Water District (TVWD). The BCGSA is governed by a Board of Directors (Board), composed of three governing members, one member appointed by the representatives from each agency. The governing Board members will serve without terms, and at the discretion of the agency which appointed them. The Board designated a consultant to act as the Administrator for the BCGSA and provide administrative services as needed and required by SGMA and the BCGSA until the GSP is adopted. Information about the current BCGSA Board members can be found on the BCGSA website: https://www.bedfordcoldwatergsa.com/about-us/.

The point of contact for the BCGSA is the Plan Manager, Margie Armstrong. At the time of writing this GSP, the following is the current contact information:

BCGSA Plan Manager: Margie Armstrong
Deputy Treasurer
Bedford-Coldwater Subbasin GSA
31315 Chaney Street
Lake Elsinore, CA 92530

951-674-3146 Ext 8306
margie@evmwd.net
http://www.evmwd.com/

An organizational chart for the BCGSA is presented on **Figure 1-3** below.

Figure 1-3. BCGSA Management Structure

1.3.2. Legal Authority

A Joint Powers Agreement (Agreement) to create a Joint Powers Authority (JPA) for the management of the Basin was entered into as of February 28, 2017 (**Appendix A**). The Agreement to form the BCGSA is by and between Corona, a California General Law City organized and existing under the laws of the State of California, EVMWD, a Municipal Water District organized under Water Code §§ 71000 et seq., and TVWD, a California Water District organized under California Water Code §§ 34000 et seq.. BCGSA signed a resolution to become the GSA for the Basin on March 29, 2017 (**Appendix B**, BCGSA 2017).

1.3.3. GSP Implementation Cost Estimate and Schedule

GSP implementation cost and schedule is described in detail in Section 9, Plan Implementation. Costs associated with implementing the GSP are considered to be either continually ongoing (operating) costs, or GSP implementation costs associated with specific management actions and projects. Annual operating costs in 2021 dollars are expected to be approximately $60,000. Annual implementation of management actions is estimated at approximately $200,000 per year, while total costs for recommended, one-occurrence projects is approximately $625,000 (including the first 5-Year GSP update). Estimated costs for years after the 5-Year GSP update will be reevaluated within the first 5-Year GSP update.

The BCGSA has committed to implementing the GSP upon adoption and completing the projects and management actions necessary to monitor and maintain sustainability within the first 5 years of initiation of the GSP. A preliminary schedule for implementation is provided in Section 9 as **Figure 9-1**.

1.4. GSP ORGANIZATION

This GSP was prepared according to guidance documents provided by DWR (DWR 2016a). The following outlines the GSP contents:

- **Section 1 – Introduction**, purpose of the GSP, sustainability goal, agency information, and GSP organization.
- **Section 2 – Plan Area** description, water use sectors, water supply sources, water resources monitoring and management programs, current general plans, other GSP elements.
- **Section 3 – Hydrogeologic Conceptual Model**, description of the physical basin setting including surface water features, soils, geologic setting, faults, and aquifers, defined basin bottom, recharge and discharge areas, and cross sections.
- **Section 4 – Current and Historical Groundwater Conditions**, discussion of groundwater elevations, land subsidence, groundwater quality and current monitoring, constituents of concern regarding water quality, interconnection of surface water and groundwater and the effects on groundwater dependent ecosystems (GDEs).
- **Section 5 – Water Budget**, discussion of the water budget, groundwater model, surface water and groundwater balance, change in groundwater storage, and estimate of sustainable yield.
- **Section 6 – Sustainable Management Criteria**, sustainability goal, sustainability criteria for the six undesirable results.
- **Section 7 – Monitoring Network**, discussion of the monitoring that will continue to assess sustainability in the future.
- **Section 8 – Projects and Management Actions**, descriptions of projects and management actions for the Basin.
- **Section 9 – Plan Implementation**, estimate of GSP implementation costs, schedule, plan for annual reporting and periodic evaluations.
- **Section 10 – References**

The GSP Preparation Checklist providing the chapter locations for GSP content requirements is provided in **Table 1-1** and the GSP Elements Guide detailing GSP content in comparison to SGMA articles is included in **Appendix C**. Figures in following sections are placed at the end of the section.

Table 1-1. GSP Preparation Checklist

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 3. Technical and Reporting Standards				
352.2		Monitoring Protocols	- Monitoring protocols adopted by the GSA for data collection and management - Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin	Section 7.2
Article 5. Plan Contents, Subarticle 1. Administrative Information				
354.4		General Information	- List of references and technical studies	Section 10
354.6		Agency Information	- GSA mailing address - Organization and management structure - Contact information of Plan Manager - Legal authority of GSA - Estimate of implementation costs	Section 1.3
354.8(a)	10727.2(a)(4)	Map(s)	- Area covered by GSP (Figure 1-1) - Adjudicated areas, other agencies within the basin, and areas covered by an Alternative (Figure 1-1) - Jurisdictional boundaries of federal or State land (Figure 2-1) - Existing land use designations (Figures 2-7, 2-8) - Density of wells per square mile (Figures 2-3 through 2-6)	Section 2
354.8(b)		Description of the Plan Area	- Summary of jurisdictional areas and other features	Section 2.1
354.8(c) 354.8(d) 354.8(e)	10727.2(g)	Water Resource Monitoring and Management Programs	- Description of water resources monitoring and management programs - Description of how the monitoring networks of those plans will be incorporated into the GSP - Description of how those plans may limit operational flexibility in the basin - Description of conjunctive use programs	Section 2.1.4 Section 2.1.4.1 Section 2.1.4.2 Section 2.1.6
354.8(f)	10727.2(g)	Land Use Elements or Topic Categories of Applicable General Plans	- Summary of general plans and other land use plans - Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects - Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans - Summary of the process for permitting new or replacement wells in the basin - Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management	Section 2.1.5 Section 2.1.5.3 Section 2.1.5.4 Section 2.1.5.5 Section 2.1.6
Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)				
354.8(g)	10727.4	Additional GSP Contents	**Description of Actions related to:** - Control of saline water intrusion - Wellhead protection - Migration of contaminated groundwater - Well abandonment and well destruction program - Replenishment of groundwater extractions - Conjunctive use and underground storage - Well construction policies - Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects - Efficient water management practices - Relationships with State and federal regulatory agencies - Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity - Impacts on groundwater dependent ecosystems	Section 2.1.6
354.10		Notice and Communication	- Description of beneficial uses and users - List of public meetings - GSP comments and responses - Decision-making process - Public engagement - Encouraging active involvement - Informing the public on GSP implementation progress	Section 2.1.7 Appendix J (pending) Appendix J (pending) Section 1.3.1 Appendix D Section 2.1.7 Section 2.1.7

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 2. Basin Setting				
354.14		Hydrogeologic Conceptual Model	- Description of the Hydrogeologic Conceptual Model - Two scaled cross-sections - Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies	Section 3, Figure 3-8 and 3-9
9	10727.2(a)(5)	Map of Recharge Areas	- Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas	Figure 3-10
	10727.2(d)(4)	Recharge Areas	- Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin	Section 3.10
354.16	10727.2(a)(1) 10727.2(a)(2)	Current and Historical Groundwater Conditions	- Groundwater elevation data - Estimate of groundwater storage - Seawater intrusion conditions - Groundwater quality issues - Land subsidence conditions - Identification of interconnected surface water systems - Identification of groundwater-dependent ecosystems	Section 4
354.18	10727.2(a)(3)	Water Budget Information	- Description of inflows, outflows, and change in storage - Quantification of overdraft - Estimate of sustainable yield - Quantification of current, historical, and projected water budgets	Section 5.7, Section 5.8, and Section 5.9
	10727.2(d)(5)	Surface Water Supply	- Description of surface water supply used or available for use for groundwater recharge or in-lieu use	Section 2.1.2.1, Section 3.11, Section 5.6.2
354.20		Management Areas	- Reason for creation of each management area - Minimum thresholds and measurable objectives for each management area - Level of monitoring and analysis - Explanation of how management of management areas will not cause undesirable results outside the management area - Description of management areas	Section 5.4
Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria				
354.24		Sustainability Goal	- Description of the sustainability goal	Section 6.1.1
354.26		Undesirable Results	- Description of undesirable results - Cause of groundwater conditions that would lead to undesirable results - Criteria used to define undesirable results for each sustainability indicator - Potential effects of undesirable results on beneficial uses and users of groundwater	Section 6.2.1 Section 6.2.2 Section 6.2.3 Section 6.2.4
354.28	10727.2(d)(1) 10727.2(d)(2)	Minimum Thresholds	- Description of each minimum threshold and how they were established for each sustainability indicator - Relationship for each sustainability indicator - Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater - Standards related to sustainability indicators - How each minimum threshold will be quantitatively measured	Sections 6.2 through 6.7
354.30	10727.2(b)(1) 10727.2(b)(2) 10727.2(d)(1) 10727.2(d)(2)	Measureable Objectives	- Description of establishment of the measureable objectives for each sustainability indicator - Description of how a reasonable margin of safety was established for each measureable objective - Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones	Sections 6.2 through 6.7

GSP Regulations Section	Water Code Section	Requirement	Description	Section(s) or Page Number(s) in the GSP
Article 5. Plan Contents, Subarticle 4. Monitoring Networks				
354.34	10727.2(d)(1) 10727.2(d)(2) 10727.2(e) 10727.2(f)	Monitoring Networks	- Description of monitoring network - Description of monitoring network objectives - Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions - Description of how the monitoring network provides adequate coverage of Sustainability Indicators - Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends - Scientific rational (or reason) for site selection - Consistency with data and reporting standards - Corresponding sustainability indicator, minimum threshold, measureable objective, and interim milestone - Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used - Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies	Section 7.1 Section 7.0
354.36		Representative Monitoring	- Description of representative sites - Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators - Adequate evidence demonstrating site reflects general conditions in the area	Section 7.3
354.38		Assessment and Improvement of Monitoring Network	- Review and evaluation of the monitoring network - Identification and description of data gaps - Description of steps to fill data gaps - Description of monitoring frequency and density of sites	Section 7.5 Section 7.5.1 Section 7.5.2 Section 7.1.1
Article 5. Plan Contents, Subarticle 5. Projects and Management Actions				
354.44		Projects and Management Actions	- Description of projects and management actions that will help achieve the basin's sustainability goal - Measureable objective that is expected to benefit from each project and management action - Circumstances for implementation - Public noticing - Permitting and regulatory process - Time-table for initiation and completion, and the accrual of expected benefits - Expected benefits and how they will be evaluated - How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. - Legal authority required - Estimated costs and plans to meet those costs - Management of groundwater extractions and recharge	Section 8.0
354.44(b)(2)	10727.2(d)(3)		- Overdraft mitigation projects and management actions	Section 8.2
Article 8. Interagency Agreements				
357.4	10727.6	Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency.	**Coordination Agreements shall describe the following:** - A point of contact - Responsibilities of each Agency - Procedures for the timely exchange of information between Agencies - Procedures for resolving conflicts between Agencies - How the Agencies have used the same data and methodologies to coordinate GSPs - How the GSPs implemented together satisfy the requirements of SGMA - Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations - A coordinated data management system for the basin - Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department	N/A

2. PLAN AREA

The following section, consistent with GSP Regulations §354.8, provides a description of the Plan Area.

The Bedford-Coldwater Subbasin (Basin) has been the focus of historical and ongoing collaborative groundwater basin management among three key agencies: City of Corona (Corona), Elsinore Valley Municipal Water District (EVMWD), and Temescal Valley Water District (TVWD). As noted in Chapter 1 of this Groundwater Sustainability Plan (GSP), the Basin is currently listed by the Department of Water Resources (DWR) as a very low priority groundwater basin. Therefore, preparation of a GSP is not required. The agencies that have been collaborating to manage the Basin, through the Bedford-Coldwater Groundwater Sustainability Agency (BCGSA), have confirmed their collective dedication to management for groundwater sustainability and have decided to prepare a GSP.

2.1. DESCRIPTION OF THE PLAN AREA

The following provides a general description of the Bedford-Coldwater Basin, including local jurisdictions, water resource management and monitoring programs, well permitting procedures, general plans and other land use plans, and additional groundwater management elements.

2.1.1. Geographic Area

Figure 1-1 shows the boundaries of the Plan Area, namely the Bedford-Coldwater Groundwater Subbasin located in western Riverside County. **Figure 1-1** also shows the adjacent Temescal Basin to the northwest (separated by a groundwater divide near Bedford Wash) and Elsinore Valley Subbasin located on the southern boundary. Both the Elsinore Valley Groundwater Sustainability Agency (GSA) and Temescal Subbasin GSA are in the process of developing GSPs for their respective subbasins. Bedford-Coldwater Basin is bound on the east and west by consolidated rocks of Estelle Mountain and the Santa Ana Mountains, respectively. The major drainage is Temescal Wash, traverses the three groundwater basins along its 26-mile course from Lake Elsinore to the Prado Wetlands on the Santa Ana River.

2.1.2. Jurisdictional Agencies

This section identifies agencies with land use management responsibilities. There are no economically distressed areas, disadvantaged communities, or severely disadvantaged communities in the Basin.

County. The Basin is located wholly within Riverside County. Riverside County has jurisdiction for land use planning for unincorporated areas. Riverside County also has responsibility for small water systems in the County that have between 15 and 199 service connections and those serving restaurants, schools, and industry. It also provides limited regulatory oversight to those water systems serving between 5 and 14 service connections. The County oversees on-site wastewater treatment systems (OWTS) through its Department of Environmental Health. The Department of Environmental Health also evaluates existing residential water wells and makes a determination if the water meets certain minimum standards.

City of Corona. Figure 2-1 shows the boundaries of the other jurisdiction that has land use management responsibilities, the City of Corona. General plan elements relevant to the GSP are discussed in Section 2.1.3. In addition to land use planning, Corona Department of Water and Power is responsible for stormwater management, sewage collection, and production and distribution of potable water for Corona, including the portion within the Basin.

Federal Lands. Federal lands within the Basin include United States Department of Agriculture Forest Service – Cleveland National Forest. The area is managed by the Forest Service. No tribal lands are known within the Basin.

California Conservation Easement. According to the California Conservation Easement Database (CCED) there is an area of private land, Lee Lake Easement, with deed-based restrictions to limit land uses to those compatible with its status as open space. Lands under easement may be actively farmed, grazed, forested, or held as nature reserves. Easements are typically held on private lands with no public access. CCED represents California in the National Conservation Easement Database (NCED 2019), a national inventory of lands conserved as easements. NCED is managed by a consortium of non-governmental organizations including: Ducks Unlimited, the Trust for Public Land, Defenders of Wildlife, Conservation Biology Institute, and NatureServe.

Other. There are no state park lands or land owned by the California Department of Fish & Wildlife (CDFW) within the Basin.

2.1.2.1. Water Supply Sources

Sources for water supply for agricultural, Municipal and Industrial (M&I), and domestic uses include groundwater, imported water, and recycled water. Metropolitan Water District of Southern California (Metropolitan) is the wholesaler for imported water and its sources of water include the Colorado River and the State Water Project. Both Corona and TVWD receive imported water from Metropolitan for distribution in the Basin. EVMWD also receives imported water from Metropolitan through Western Municipal Water District (WMWD), but only distributes imported water within the Basin when groundwater supply to domestic users is insufficient.

Water Providers. The BCGSA was created through a Joint Powers Authority agreement between Corona, EVMWD, and TVWD. **Figure 2-2** shows the service areas of these providers. Other small systems are operated by private mutual water companies and some communities do not have water purveyors and systems that provide water service. These small systems and communities—plus rural businesses, schools, parks, and residents—rely on private wells and groundwater.

- **City of Corona.** A portion of the City of Corona overlies the Basin, amounting to 1,213 acres or about 5 percent of the city's area. Corona maintains three treatment facilities and serves water to more than 150,000 residents with water supply from a combination of imported water and groundwater.
- **Temescal Valley Water District (TVWD).** TVWD is the primary purveyor in the BCGSA. TVWD, formed in 1965 as Lee Lake Water District, provides water and wastewater services to the residents of the Temescal Valley in an area covering approximately 6,730 acres.
- **Elsinore Valley Municipal Water District (EVMWD).** EVMWD supplies water to customers within the Basin from a combination of groundwater and imported water supply sources.

Groundwater. Groundwater currently is a source of water supply in the Basin. Corona, EVMWD, and TVWD all pump groundwater from the Basin. Corona and EVMWD distribute this supply to users within and outside the Basin, while TVWD only supplies groundwater to users within the Basin. There are also a few private users that pump groundwater within the Basin. Groundwater produced within the Basin is used to supply municipal, agricultural, mining, recreational, and domestic uses and users throughout the Basin and in the neighboring Temescal and Elsinore Valley Subbasins (DWR 2019a).

Water Supply Wells. Figure 2-3 shows the density of water supply wells in and around the Plan Area; this map is based on the DWR Well Completion Report Map Application tool (DWR 2019b). As indicated, the density of supply wells is generally less than nine wells per square mile. Relatively high densities occur around the northern margins of the Basin, where the Corona and EVMWD wells are located. **Figures 2-4**, **2-5**, and **2-6** show the estimated density of domestic wells, production wells, and public wells. Most of the production wells, as classified by DWR, are presumably irrigation wells but also include some industrial and commercial wells.

Outside of the three major purveyors, there is only one public water system; Glen Ivy Hot Springs has one well and serves an estimated population of 750 people. The Glen Ivy Hot Springs well is located in the southwestern portion of the Basin (**Figure 2-2**).

Imported Water. Corona, TVWD, and EVMWD rely on imported water from Metropolitan. Metropolitan imports water to Southern California from two main sources: the Sacramento and San Joaquin Rivers through the State Water Project and the Colorado River via the Colorado River Aqueduct. Corona receives imported water from Metropolitan through WMWD. Temescal Valley Water District receives State Water Project imported by Metropolitan and treated at the Henry J. Mills Treatment Plant in Riverside. EVMWD also receives imported water from Metropolitan through WMWD, but only distributes to domestic users if groundwater is insufficient. Imported water and other water infrastructure are shown on **Figure 2-7**.

Recycled Water. Water recycling occurs in both Corona and TVWD. Recycled water use is a relatively small but increasing supply. In TVWD, recycled water is distributed to multiple sites within TVWD's service area, including the Retreat Golf Course in the northern portion of the Basin and the Deleo Sports Park along Sycamore Creek in the south Basin (RMC and Woodard & Curran 2017).

2.1.3. Water Use Sectors

Water use sectors are defined in the GSP Regulations as categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation. In the Basin, these are summarized as follows:

- Urban water use sectors are focused in the City of Corona area but extend through the center of the Basin.
- Areas of industrial water use are limited.
- Agricultural land uses comprise limited areas of citrus in the southwestern portion of the Basin (20.5 acres).
- There is no current managed aquifer recharge in the Basin.
- Native vegetation, including rangeland, accounts for the remainder including upland areas and along streams.

2.1.4. Water Resources Monitoring and Management Programs

This section summarizes water resources monitoring and management in the Basin. Corona, EVMWD, and TVWD have entered into a Joint Powers Authority (JPA) agreement for the purpose of forming and executing the responsibilities of the BCGSA in accordance with the Sustainable Groundwater Management Act (SGMA). The BCGSA encompasses the entirety of the Bedford-Coldwater Subbasin of the Elsinore Groundwater Basin (Basin 8-004.2, DWR 2016b).

Groundwater has been an important component of water supply in the Basin for more than 100 years. Until the 1970s, most of the groundwater production in the Basin was for agricultural supply (Todd and AKM 2008). A few well owners have also produced small amounts of groundwater for domestic use (Todd and AKM 2008). Production for municipal supply increased in the 1960s and 1970s and continues today.

For more than 50 years, Corona, EVMWD, and TVWD have relied on groundwater from the Basin for municipal use, and these agencies have long been responsible for managing groundwater conditions in the Basin. Corona and EVMWD have longstanding legal agreements for the management of withdrawals from the Coldwater area portion of the Basin. Additionally, Corona, in coordination with TVWD, adopted a Groundwater Management Plan (GWMP) in 2008 that covers the Basin.

In 2008, Corona and EVMWD established a legal agreement for the Coldwater portion of the Basin where most of the pumping occurs. The 2008 agreement is intended to enhance groundwater supply in order to maximize the sustainable use of groundwater. One of the goals of the agreement is to give Corona and EVMWD the ability to estimate annual groundwater production that ensures the sustainability of the Subbasin as a water supply. Historically, Corona and EVMWD account for most of the production in the Basin, with Corona historically pumping about twice as much as EVMWD (Todd and AKM 2008). The agreement is based on this historical distribution of groundwater use and also recognizes the presence of private pumpers in the Basin. This agreement allots four percent of annual groundwater use to private pumpers.

The agreement encourages development of joint groundwater management projects to enhance recharge including the recharge of local surface water by both parties. EVMWD also has surface water rights in the Basin that can be used for recharge enhancement. The 2008 agreement provides a process for allocating production on an annual basis, accounting for production rights and a groundwater storage account. Every five years, the native safe yield is re-evaluated, and each party's share of that yield is adjusted. To date, four annual reports have been completed (WEI 2016 and 2017b).

The only pumpers in the Bedford area of the Basin are the three agencies of the BCGSA.

Corona and TVWD service areas cover almost all of the Basin; those portions outside of these service areas are not within the service area of any local water agency. The BCGSA is coordinating with Riverside County and other agencies for these areas.

2.1.4.1. Water Resource Monitoring

The overall objective of the monitoring networks for this GSP is to yield representative information about water conditions in the Basin as necessary to guide and evaluate GSP implementation. Water resource monitoring programs considered in this section include:

- Climate
- Surface water flows
- Imported water deliveries
- Water recycling
- Land use and cropping
- Wells and groundwater pumping
- Groundwater levels
- Land subsidence
- Water quality

Monitoring programs undertaken by local, state, and federal agencies are summarized below as they are relevant to the GSP.

Climate. Climate data collection stations and records have been reviewed and assessed for the Basin and surrounding areas. Previous investigations (Todd and AKM 2008, SAIC 2007, MWH 2004) have revealed substantial variability in precipitation amounts because of elevation differences between the Temescal Valley and the nearby Santa Ana Mountains. These orographic effects result in significantly more precipitation on the upland areas of the watersheds that contribute to the Basin. However, operational rain gages exist only in

EVMWD, Riverside, and at the top of Santiago Peak. Therefore, precipitation on the Basin itself and on the slopes of the Santa Ana Mountains below Santiago Peak must be modeled.

There are three currently active climate monitoring stations near the Basin: the Lake Elsinore station maintained by the National Oceanic Atmospheric Administration (NOAA), the Santiago Peak station maintained by Orange County, and the UC Riverside California Irrigation Management Information System (CIMIS). The Lake Elsinore and UC Riverside stations include daily precipitation and evapotranspiration data; the Santiago Peak station collects monthly precipitation data. Monthly data for the Santiago Peak station are from January 1949 to current, with a slight lag on recent data. The Lake Elsinore station has daily data from January 1961 through current, and monthly data from 1897. The UC Riverside station has daily data from January 1986 through the present.

In addition to station-specific climate records, PRISM Climate Group (PRISM) data are also available. PRISM gathers climate observations from a wide range of monitoring networks, applies sophisticated quality control measures, and develops spatial climate datasets. These datasets incorporate a variety of modeling techniques and are available at multiple resolutions covering the period from 1895 to the present. These datasets include elevation-varying average precipitation isohyets that can be used to estimate or simulate precipitation throughout the watershed contributing to the Basin (PRISM 2018).

Surface water flows. There are three streamflow gage stations near the Basin that are maintained by the United States Geological Survey (USGS 2018). These stations are located on Temescal Creek at about Main Street in Corona (USGS 11072100), Temescal Creek at Corona Lake (USGS 11071900), and San Jacinto River near Elsinore (USGS 11070500). These stations are all active and have records that begin in October 1980, November 2012, and January 1950, respectively.

Imported water deliveries. Imported water data and locations are monitored and available from Corona, EVMWD, and TVWD. Data are available monthly for Corona from 2005 to present, annually for TVWD from 1990 to present, and monthly for EVMWD from 1995 to present.

Recycled water. Corona and TVWD monitor and maintain records of recycled water use records and distribution locations. TVWD supplies non-potable recycled water to Retreat Golf Course on the north end of the Basin and the Deleo Sports Park along Sycamore Creek on the south end.

Wells and groundwater pumping. Groundwater production in the Basin is tracked by the Santa Ana River Watermaster, along with production in the rest of the watershed. WMWD currently coordinates groundwater use data collection.

Groundwater levels. Multiple agencies have historically monitored groundwater levels in the Basin, including Corona, EVMWD, USGS, and DWR.

Land use. Land use map data were collected from DWR, the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP), and Riverside County. The available land use maps are indicated below:

- DWR: 2014 statewide land use mapping specifically developed for SGMA and GSPs.
- FMMP: 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, and 2016
- Riverside County: 1993 and 2000

Agricultural land is currently limited to approximately 20.5 acres of citrus/subtropical fruits (avocados and others) located on the southwestern edge of the Basin.

Land subsidence. While the potential for subsidence was recognized in the 2008 Groundwater Management Plan, it has not been a known issue in the Basin and ground surface elevations have not been monitored until recently. The TRE Altamira Interferometric Synthetic Aperture Radar (InSAR) Dataset, provided by DWR through the SGMA Data Viewer (DWR 2019c) and showing vertical ground surface displacement from June 2015 to June 2018, indicates that the Basin has been characterized by uplift over that period, likely reflecting tectonic factors. No known available sources of data indicate subsidence in the Basin. Groundwater levels have been managed to stay above historical low levels to minimize the potential for ground settlement.

Water quality. Groundwater quality in the Basin is monitored by the BCGSA agencies and Glen Ivy Hot Springs for compliance with State Water Resources Board Division of Drinking Water (DDW) requirements, and by facilities regulated by the Santa Ana Regional Water Quality Control Board (RWQCB).

Section 7 of this GSP documents the BCGSA monitoring network including how these objectives are met, descriptions of how each sustainability criteria will be monitored, and protocols for measurements.

2.1.4.2. Water Resources Management

This section describes the water resources management plans developed for the Plan Area; note that monitoring is addressed in Section 2.1.4.1.

Groundwater Management Plan, 2008. A GWMP was adopted in 2008 that covers the Basin. The GMP included projects in the Bedford-Coldwater area including the Coldwater Subbasin Enhanced Recharge Project and Lee Lake Water District's (now TVWD) Recharge to Bedford Subbasin. The GMP includes a quantitative water balance for the area, but Bedford-Coldwater was not included in the numerical model developed to evaluate management programs and projects (Todd and AKM 2008).

Numerical Groundwater Modeling. There is no pre-existing numerical model that covers the entire Basin. A model of the Coldwater area was prepared by MWH in 2004 (MWH 2004), and this is the only numerical groundwater model covering any portion of the Basin. This model is documented in the *Coldwater Basin Recharge Feasibility Study* (MWH 2004). Numerical groundwater modeling for the purpose of the GSP is discussed in later chapters of this document.

Integrated Regional Water Management Plan (IRWMP), 2008. The IRWMP is a collaborative effort led by WMWD to identify regional and multi-benefit projects within member agencies service areas. Adopted in 2008, the IRWMP describes the region, provides goals and objectives, and identifies and evaluates projects and programs, including assessment of climate change.

The IRWMP identifies and prioritizes integrated regional projects for the watershed to maximize benefits to the broadest group of stakeholders in the region. Projects in the Bedford-Coldwater area include new water wells for Corona and managed recharge using recycled water infiltration in surface recharge basins or injection wells in the Bedford area (Kennedy/Jenks 2008a and 2008b).

Salt and Nutrient Management Plan (SNMP), 2017. SNMPs are required for groundwater basins throughout California and are intended to help streamline permitting of new recycled water projects while ensuring attainment of water quality objectives and protection of beneficial uses. The Upper Temescal Valley (UTV) SNMP prepared by WEI was a joint management plan, prepared by the EVMWD and the Eastern Municipal Water District (EMWD) (WEI 2017a).

Wastewater services include the treatment of wastewater generated in their respective service areas and the subsequent discharge and reuse of treated wastewater, hereafter referred to as recycled water. The goal of the SNMP was to define management activities to comply with the total dissolved solids (TDS) and nitrate concentration objectives of the groundwater management zones (GMZs) and surface water bodies that are impacted by recycled water discharge and reuse in the UTV Watershed. The UTV SNMP recommends updates to the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan) for water quality objectives for the entire upper Temescal Valley but does not provide objectives for individual GMZs. Water quality objectives and ambient water quality numbers were estimated for both TDS and nitrate for the entire UTV SNMP. Ambient water quality will be recomputed periodically.

Recycled Water Plans 2007 through 2016. TVWD prepared a series of plans for its recycled water, including assessment of system-wide impacts to groundwater quality. The planning documents include:

- Recycled Water Master Plan (Lee Lake Water District 2007).
- Water System Master Plan (Lee Lake Water District 2014).
- Temescal Valley Water District Comprehensive Water, Recycled Water, and Wastewater Cost of Service Study Report (Raftelis 2016).

Water Quality Control Plan for the Santa Ana Region. The Basin Plan was approved in 1994 and provides the framework for how surface water and groundwater quality in the Santa Ana

Region should be managed to provide the highest water quality reasonably possible. The Basin Plan lists beneficial uses, describes the water quality which must be maintained to allow those uses, provides an implementation plan, details State Water Resources Control Board (SWRCB) and RWQCB plans and polices to protect water quality, and presents surveillance and monitoring programs. The most recent update in 2004 revises groundwater basin boundaries, updates beneficial uses, and presents GMZ water quality objectives.

Urban Water Management Plans (UWMPs). The California Urban Water Management Planning Act requires preparation of UWMPs by urban water providers with 3,000 or more connections. The UWMPs, generally required every five years, provide information on water supply and water demand—past, present, and future—and allow comparisons as a basis for ensuring reliable water supplies. UWMPs examine water supply and demand in normal years and during one-year and multi-year droughts. UWMPS also provide information on per-capita water use, encourage water conservation, and present contingency plans for addressing water shortages. UWMPs have been prepared for Corona, TVWD, and EVMWD (KWC 2016, RMC and Woodard & Curran 2017, MWH 2016).

Despite challenges of drought, climate change, and environmental and legal factors, the three agencies have been able to provide reliable supply. This has been achieved by actively managing the portfolio of water supplies (groundwater, imported water, recycled water), by improving facilities (e.g., water treatment plants), and by promoting conservation.

2.1.5. General Plans, Land Use Planning, and Well Permitting

This section presents elements of General Plans and other land use planning in the Basin as relevant to groundwater sustainability. It summarizes the goals, objectives, policies, and implementation measures as variously described in the General Plans for Riverside County and the City of Corona, which together encompass the Basin. This section also summarizes local well permitting procedures and well ordinances.

2.1.5.1. Land Use

The Basin includes developed urban area, rural residential areas, and limited agriculture.

Figure 2-8 shows land use for 2014 (DWR 2017), which indicates that active agricultural land was limited to 20.5 acres of primarily subtropical orchard in the southwestern Basin.

2.1.5.2. General Plans

Land use planning within the Basin is guided by the General Plans for Riverside County and the City of Corona.

Riverside County General Plan. The Riverside County General Plan, adopted in 2015, incorporates a set of 15 Consensus Planning Principles drafted and endorsed by a coalition of Riverside County stakeholders. The General Plan encourages water use efficiency and requires that new developments *incorporate water conservation techniques, such as groundwater recharge basins, use of porous pavement, drought tolerant landscaping, and* *water recycling, as appropriate*. Additional policies ensure compliance with water efficient landscape principles, promote water conservation, and encourage the use of recycled water (Riverside County 2015).

Figure 2-9 shows general Land Use Planning Designations of the Riverside County General Plan throughout the Basin. As indicated, broad areas are designated as low and medium density residential with commercial and industrial areas near the freeway.

City of Corona General Plan. The Corona General Plan (EIP Associates 2020) was adopted in 2004 and is scheduled for update beginning in 2019. **Figure 2-9** shows the Corona planning area, including portions of the Basin.

Goals, policies, and implementation measures with relevance to groundwater sustainability include:

- Policy 1.1.4 – Accommodate the types, densities, and mix of land uses that can be adequately supported by transportation and utility infrastructure (water, sewer, etc.) and public services (schools, parks, libraries, etc.)
- Policy 1.5.14 – Require that developers demonstrate water conservation in the landscape design of their proposed projects, such as the use of drought-tolerant species.
- Policy 1.5.16 – Promote the use of recycled water for landscape irrigation, where feasible.

In addition, there are several policies linked to the development of water infrastructure to ensure that water supply and treatment and delivery systems are sustainable and cost efficient. Other policies protect water quality and minimize impact on water resources.

2.1.5.3. General Plan Influences on GSA Ability to Achieve Sustainability

Riverside County. The Riverside County General Plan addresses the importance of groundwater. The policies and implementation of the land use and public facilities/services elements indicate that the County role is to support and encourage local water agencies in ensuring that water supply is available. Similarly, with wastewater issues and protection of water quantity and quality, the County role is limited to encouragement of other agencies, developers, and landowners. The General Plan contains little policy to manage land use within the constraints of available water supply other than to encourage drought resistant plants and the use of recycled water. In the Bedford-Coldwater area, the general plan provides land use designations in the Temescal Canyon Area Plan that were used to estimate future growth.

City of Corona. Corona serves a population that is predicted to increase from 170,100 in 2020 to about 182,800 residents by 2040 (KWC 2016). Some of this growth will be along the southern edge of Corona in the Eagle Creek area within and adjacent to the Basin. The general plan indicates that Metropolitan may build an additional treatment plant in the area to meet increased water demand. Corona land use policies generally are protective of agricultural land and hillsides, and conservation policies address water efficiency, water recycling, sustainability measures, and coordination with other agencies, including TVWD.

The increased development included in the general plans was simulated by the numerical model described in Section 5 and **Appendix E**. Based on these scenarios, the basin remains sustainable even with this projected development.

2.1.5.4. GSP Influences on General Plans

The BCGSA agencies will work together to implement this GSP and rely on their portfolio of water supply to maintain sustainability. While future growth is expected based on the general plans, the agencies are committed to their agreements to limit pumping in Coldwater based on sustainable yield and import additional supplies to Bedford.

City of Corona. Implementation of the GSP will support Corona in providing continued groundwater that may be exported from the Basin to other areas of Corona. In addition, the GSP will ensure good quality water in sufficient quantities to serve its residents into the future, including drought periods.

Riverside County. The Riverside County General Plan generally assumes that local water agencies can ensure adequate high-quality water supplies into the future. The GSP provides additional specific information, documents potential challenges to water supply, and explores undesirable results that may occur with future increases in groundwater demand. Undesirable results will be defined with sustainability criteria, and if identified, will be addressed with management actions. These management actions may have ramifications for County land use planning. For example, GSPs are authorized within the GSP Plan Areas to impose well spacing requirements and control groundwater pumping and control extractions by regulating, limiting, or suspending extractions from individual groundwater wells. Such regulation may present a constraint on potential land uses.

2.1.5.5. Well Permitting

Groundwater well permitting within the Basin is currently regulated by the Riverside County Department of Environmental Health as described in Riverside County Ordinance No. 682 (as amended through 684.4). The purpose of this ordinance is to provide minimum standards for construction, reconstruction, abandonment, and destruction of all wells in order to: (a) protect underground water resources, and (b) provide safe water to persons within Riverside County pursuant to the authority cited in Chapter 13801(c) of the California Water Code. Wells regulated by Ordinance No. 682 include drinking water (domestic, industrial, community, or springs), agricultural, monitoring, and cathodic protection wells.

This ordinance is similar to the California State Guidelines for new wells under California Water Code Sections 13800 to 13806, which stipulates that local jurisdictions, including counties, cities, and water districts, have authority under the Water Code to adopt local well ordinances that meet or exceed the statewide standards. The Riverside County requirements exceed statewide standards with greater setback requirements from potentially contaminating activities such as septic systems.

The existing well permitting by the Riverside County Department of Environmental Health is the adopted standard for well permitting in this GSP.

2.1.6. Notice and Communication

As described in this section, groundwater is a source of supply in the Basin and supports a range of beneficial uses: agricultural, municipal, rural, and environmental. To some degree in the Basin, all land and property owners, residents, businesses, employees, farmers, and visitors are potentially affected by groundwater use.

The BCGSA have encouraged public participation in the ongoing planning and development activities supporting the GSP process. Public workshops regarding development of the GSP have been conducted to encourage public participation and to provide educational outreach. Meeting notices have been provided to the list of interested parties that is maintained pursuant to Water Code Section 10723.2. Additionally, GSP development information and meeting notices have been posted to the BCGSA website.

Recognizing the importance of communication, multiple and diverse agencies and interested parties have been identified. These are listed in the BCGSA Stakeholder Outreach Plan, which is included as **Appendix D.**

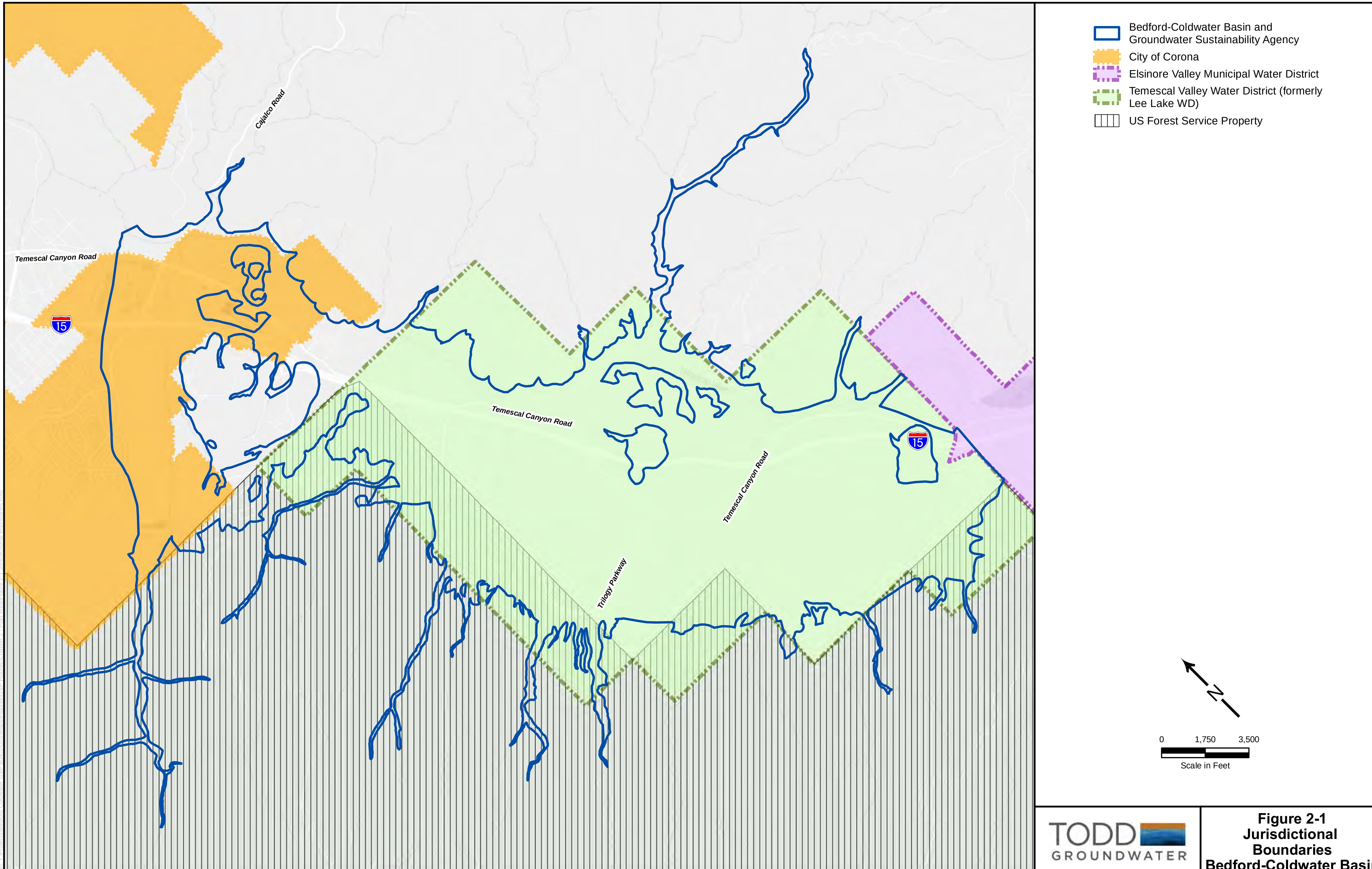


Figure 2-1
Jurisdictional Boundaries
Bedford-Coldwater Basin

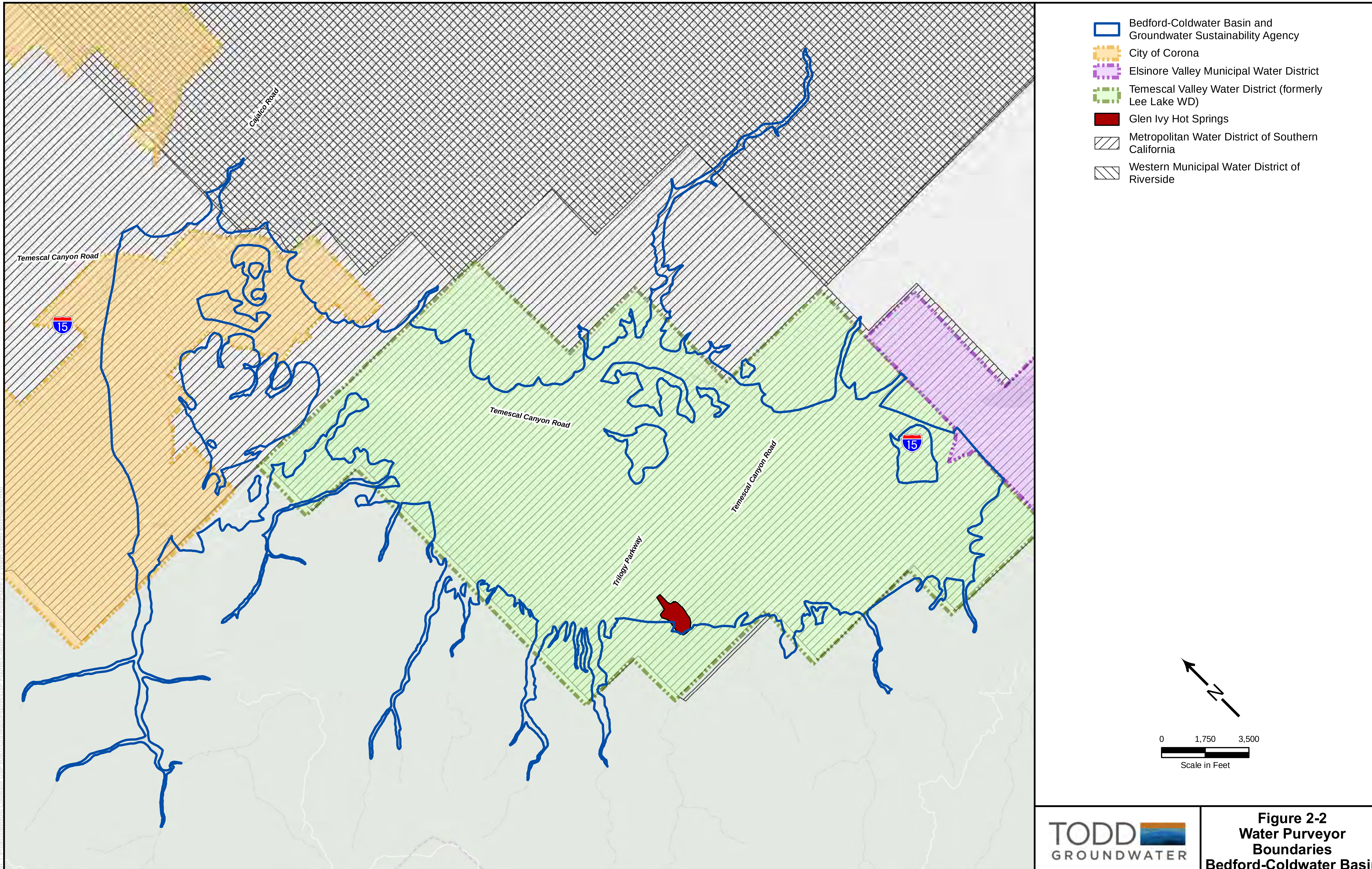
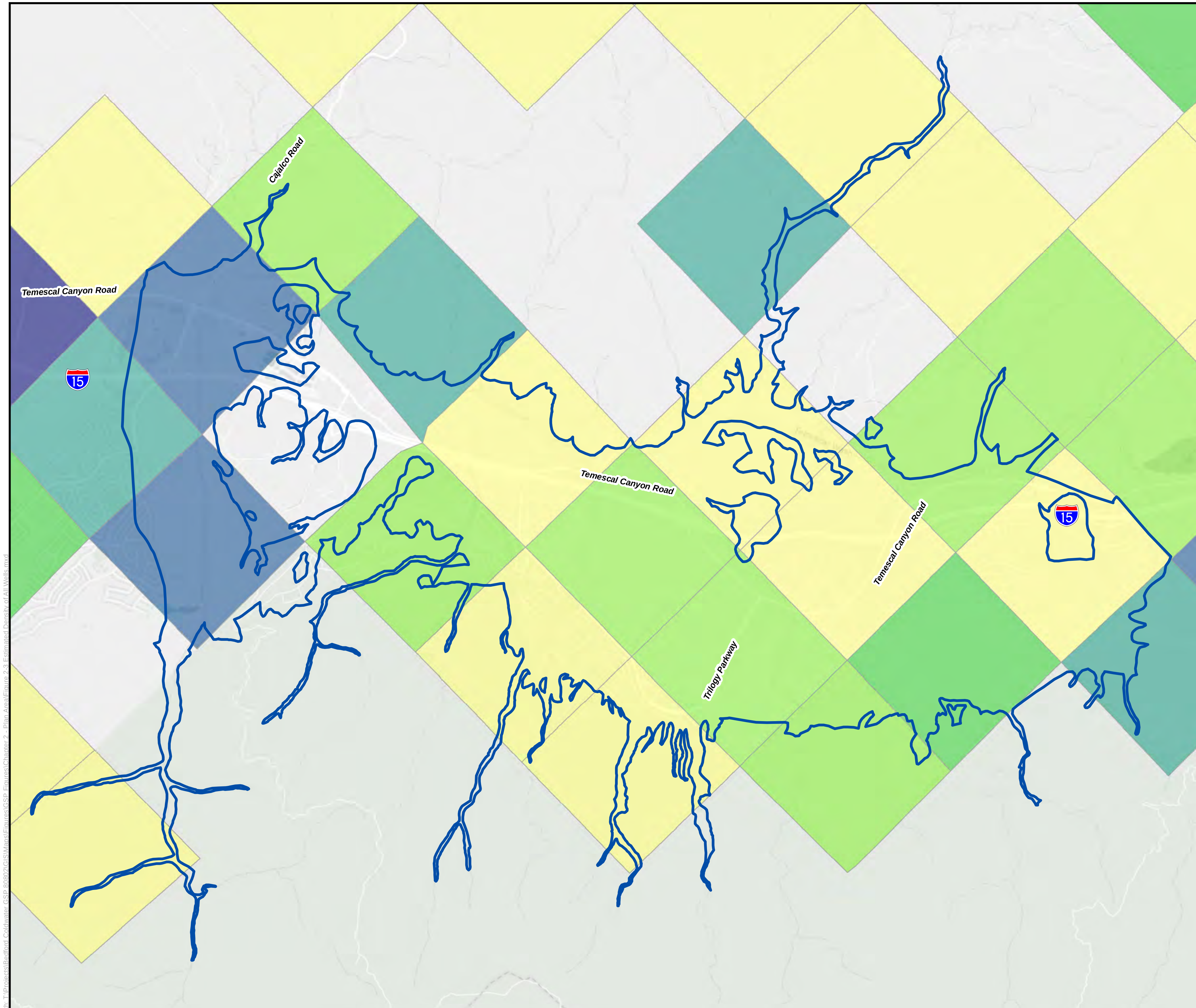


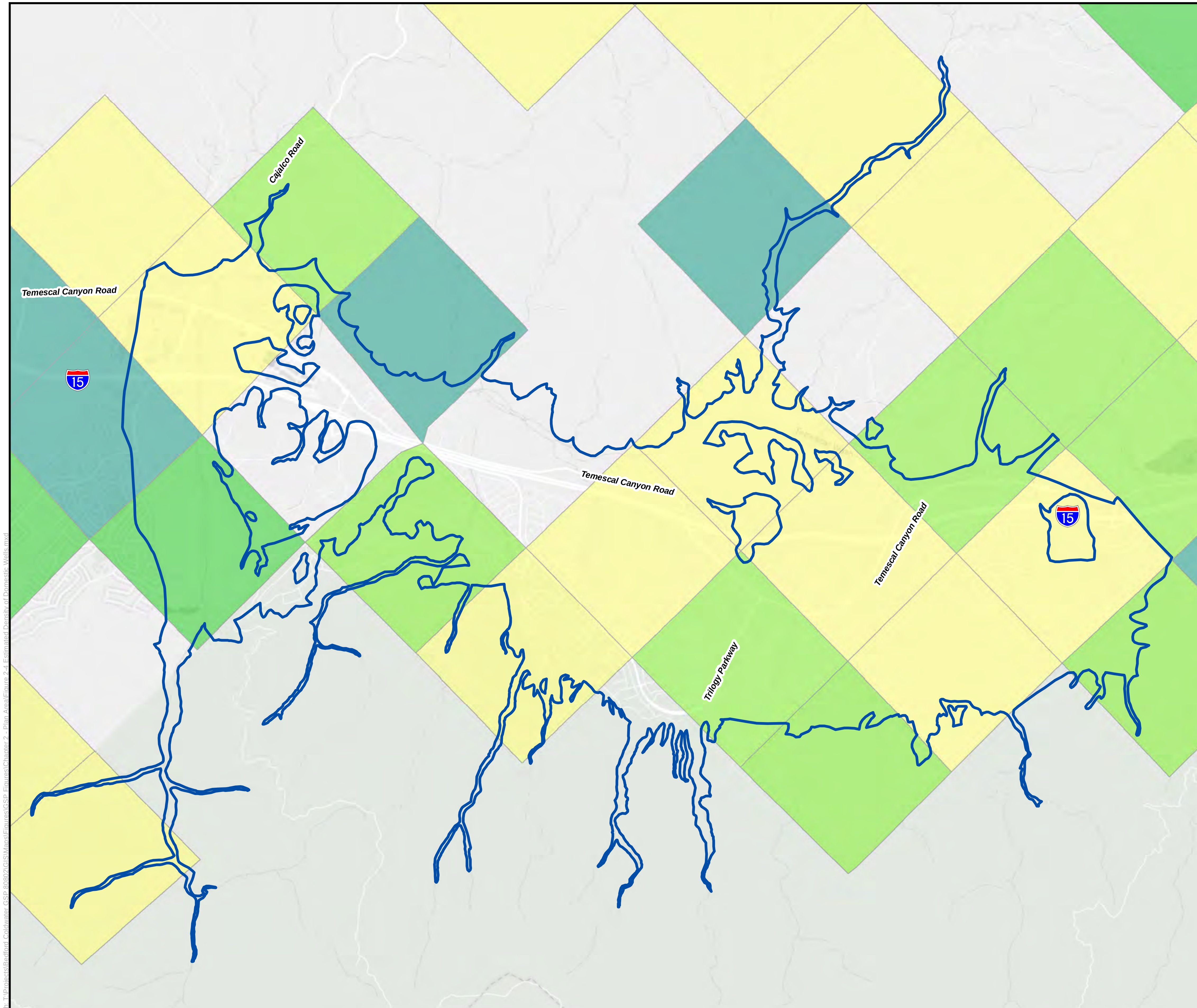
Figure 2-2
Water Purveyor Boundaries
Bedford-Coldwater Basin



* The Public Land Survey System (PLSS) is a way of subdividing and describing land in the United States. PLSS Sections are one-mile square rectangular grids of 640 miles each. All lands in the public domain are subject to subdivision by this rectangular system of surveys, which is regulated by the U.S. Department of the Interior, Bureau of Land Management (BLM).

TODD GROUNDWATER

Figure 2-3
Estimated Density of All Wells
Bedford-Coldwater Basin



Estimated Well Density - Domestic Wells

- 1 to 3 Domestic Wells
- 4 to 6 Domestic Wells
- 6 to 9 Domestic Wells
- 9 to 12 Domestic Wells
- 12 to 15 Domestic Wells
- 15 to 18 Domestic Wells
- Bedford-Coldwater Basin

N

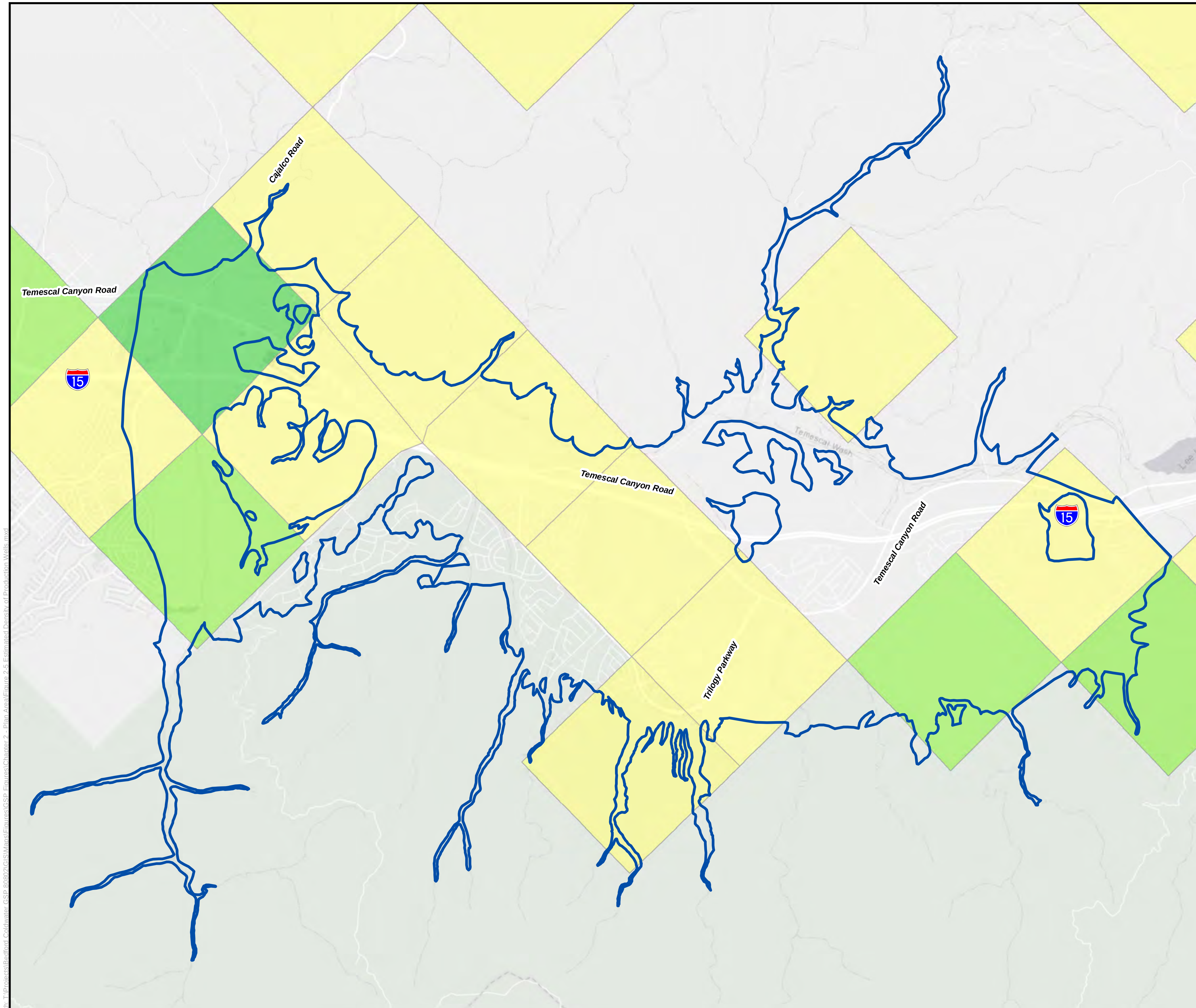
0 1,750 3,500
Scale in Feet

* The Public Land Survey System (PLSS) is a way of subdividing and describing land in the United States. PLSS Sections are one-mile square rectangular grids of 640 miles each. All lands in the public domain are subject to subdivision by this rectangular system of surveys, which is regulated by the U.S. Department of the Interior, Bureau of Land Management (BLM).

TODD GROUNDWATER

Figure 2-4
Estimated Density of Domestic Wells
Bedford-Coldwater Basin

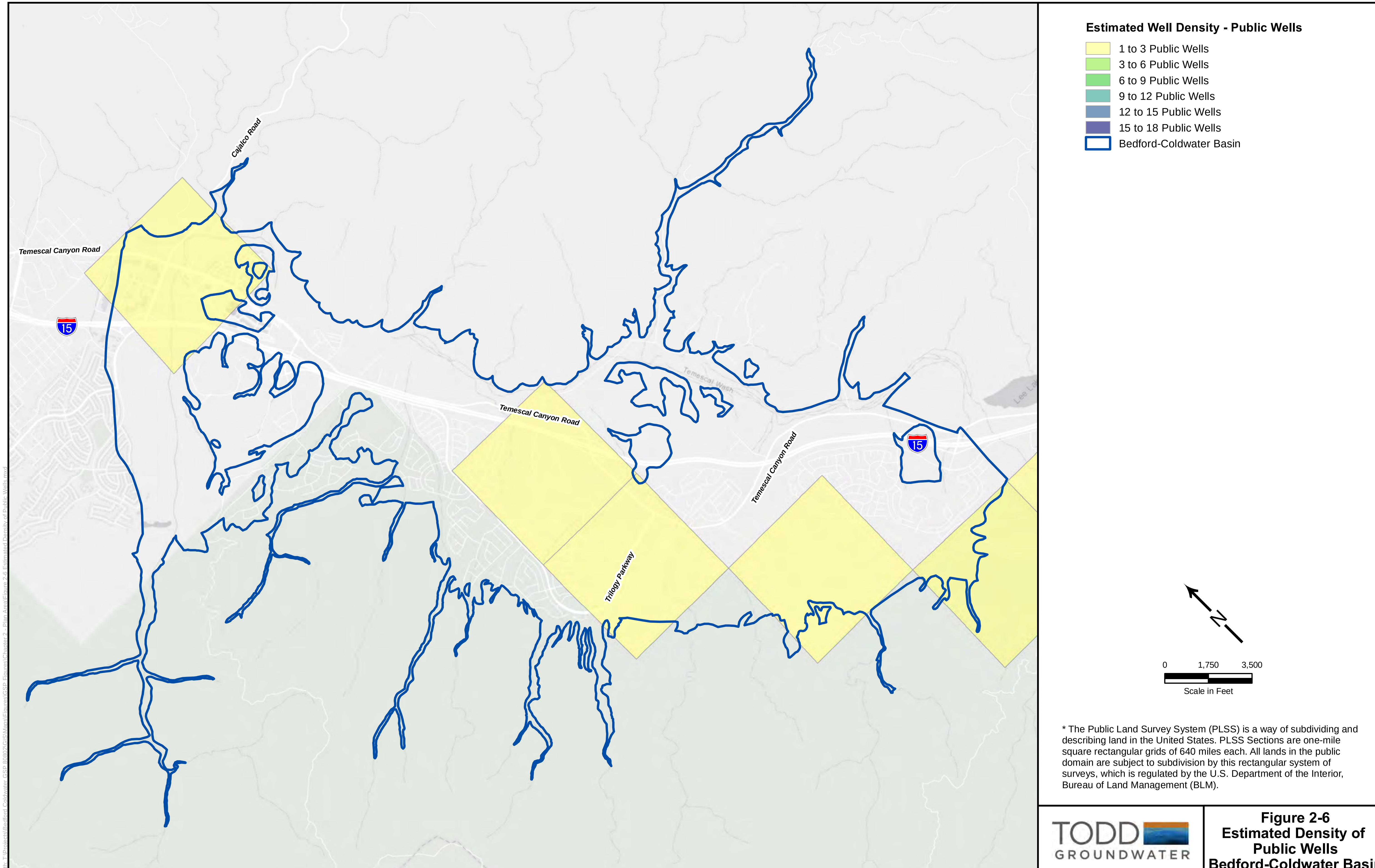
Path: T:\Projects\Bedford Coldwater GSP 80802\GIS\Maps\Figures\GSP Figures\Chapter 2 - Plan Area\Figure 2-4 Estimated Density of Domestic Wells.mxd



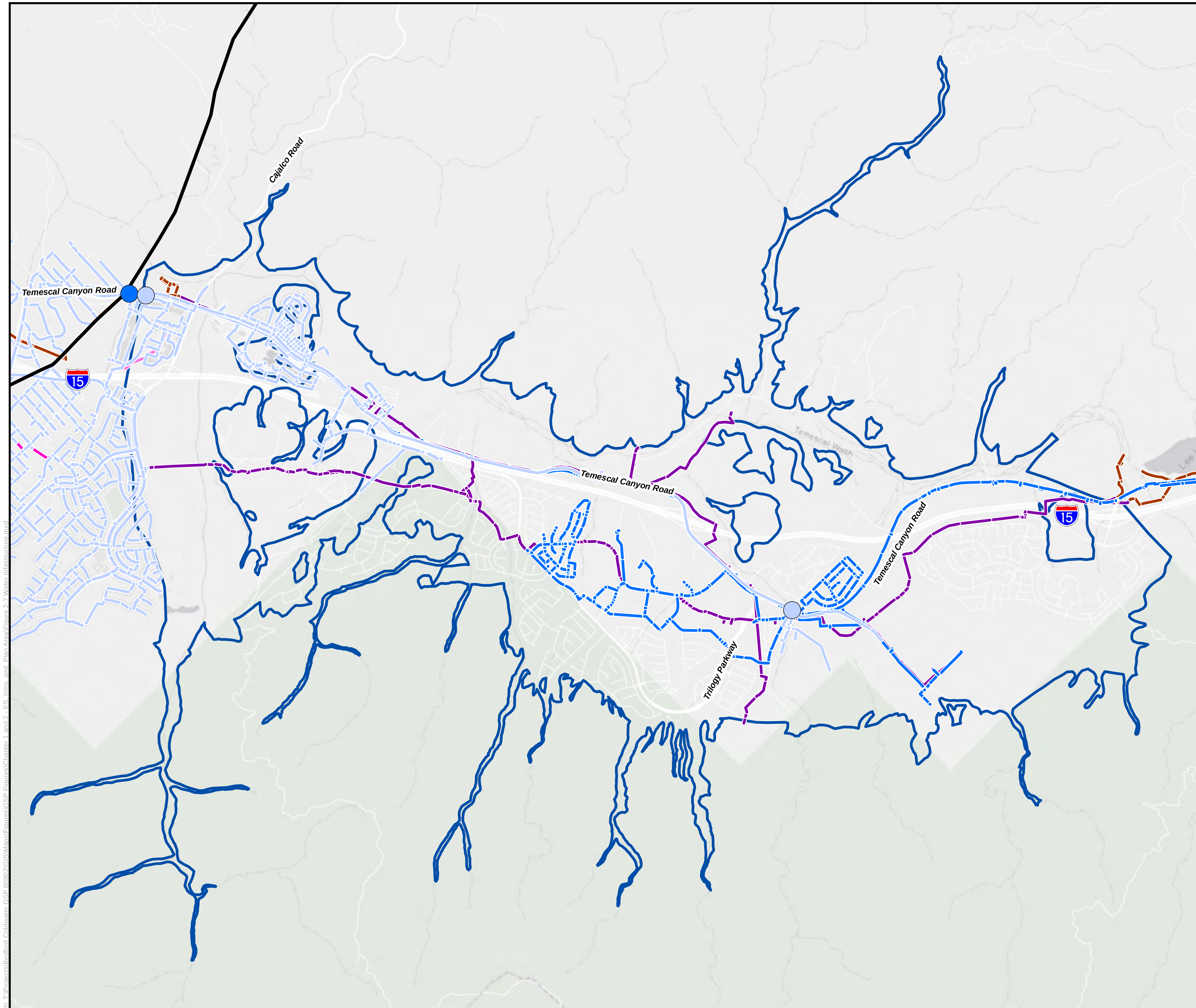
* The Public Land Survey System (PLSS) is a way of subdividing and describing land in the United States. PLSS Sections are one-mile square rectangular grids of 640 miles each. All lands in the public domain are subject to subdivision by this rectangular system of surveys, which is regulated by the U.S. Department of the Interior, Bureau of Land Management (BLM).

TODD GROUNDWATER

Figure 2-5
Estimated Density of Production Wells
Bedford-Coldwater Basin

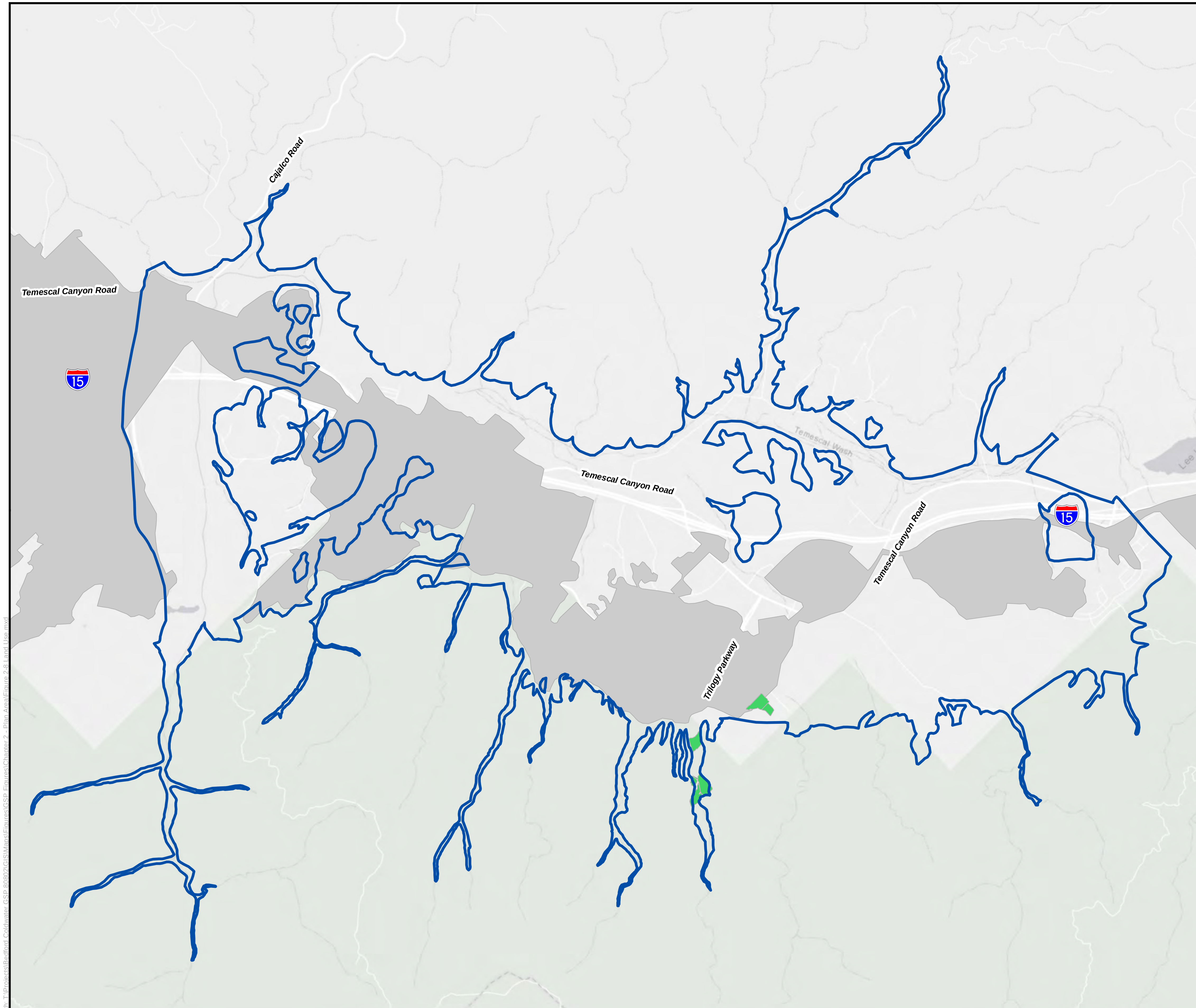


Cajalco Road
Temescal Canyon Road
15
Temescal Canyon Road
Temescal Wash
Temescal Canyon Road
15
Trilogy Parkway
Estimated Well Density - Public Wells
1 to 3 Public Wells
3 to 6 Public Wells
6 to 9 Public Wells
9 to 12 Public Wells
12 to 15 Public Wells
15 to 18 Public Wells
Bedford-Coldwater Basin
N
0 1,750 3,500
Scale in Feet
* The Public Land Survey System (PLSS) is a way of subdividing and describing land in the United States. PLSS Sections are one-mile square rectangular grids of 640 miles each. All lands in the public domain are subject to subdivision by this rectangular system of surveys, which is regulated by the U.S. Department of the Interior, Bureau of Land Management (BLM).
TODD GROUNDWATER
Figure 2-6
Estimated Density of Public Wells
Bedford-Coldwater Basin



TODD GROUNDWATER

Figure 2-7
Water Infrastructure
Bedford-Coldwater Basin



TODD GROUNDWATER

Figure 2-8
2014 Land Use
Bedford-Coldwater Basin

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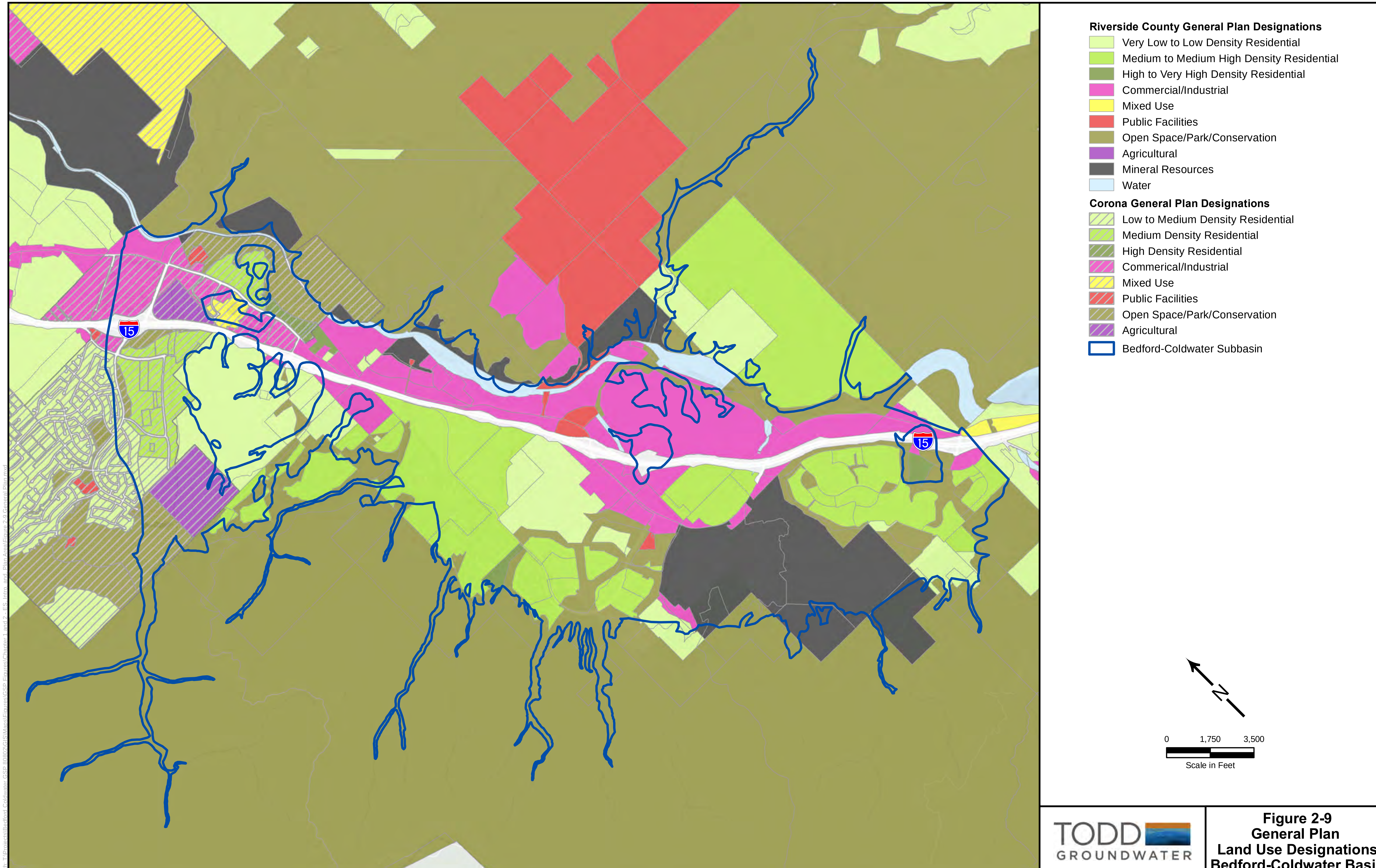


Figure 2-9
General Plan
Land Use Designations
Bedford-Coldwater Basin

3. HYDROGEOLOGIC CONCEPTUAL MODEL

This chapter describes the hydrogeologic conceptual model of the Bedford-Coldwater Subbasin (Basin), including the basin boundaries, geologic formations and structures, and principal aquifer units. The chapter also addresses the interaction between groundwater and surface water and discusses groundwater recharge and discharge areas. The Hydrogeologic Conceptual Model presented in this chapter is a summary of relevant and important aspects of the Basin hydrogeology that influence groundwater sustainability. While the Chapter 1 Introduction and Chapter 2 Plan Area establish the institutional framework for sustainable management, this chapter, along with Chapter 4 Groundwater Conditions and Chapter 5 Water Budget, sets the physical framework.

The hydrogeologic conceptual model and basin conditions sections serve to document the technical aspects of the Basin's hydrogeology. Later sections including the water budget and sustainability criteria will refer to and rely on the technical material contained here.

3.1. PHYSICAL SETTING AND TOPOGRAPHY

The Basin underlies a portion of the Elsinore Valley in western Riverside County and covers approximately 11 square miles. The Basin is adjacent to two other groundwater basins: the Temescal Subbasin of the Upper Santa Ana Basin to the north and the Elsinore Valley Subbasin of the Elsinore Basin to the south. **Figure 3-1** illustrates the topography of the Basin and surrounding uplands.

Ground surface elevations along the valley floor are generally flat. Elevations range from approximately 1,000 feet above mean sea level (msl) at the northern boundary to approximately 1,200 feet above msl to the south, as shown by 200-foot contours on **Figure 3-1**. The tributary watersheds reach up to more than 5,600 feet msl at the highest peak in the Santa Ana Mountain watersheds west of the Basin. Watersheds east of the Basin are significantly lower in elevation and rise only to about 1,800 feet.

Annual precipitation varies from below 12 inches to more than 26 inches over the Study Area. The long-term average annual rainfall is between 12 and 14 inches per year on the Basin floor and increases to more than 20 inches along the top of the local watersheds in the Santa Ana Mountains to the west.

3.2. SURFACE WATER FEATURES

Figure 3-2 shows surface water features including rivers, streams, springs, seeps, lakes, and ponds. The sub-watershed boundaries that drain into and through the Basin are shown on **Figure 3-3**.

The Basin covers a portion of the Santa Ana River watershed. Main tributaries to the Santa Ana River include Temescal Wash which flows through the Basin from the southeast to northwest and the Bedford Wash flowing toward the northeast along the northern boundary of the Basin. These waterways are ephemeral and are dry much of the year, flowing mainly during the winter.

3.3. SOILS

Characteristics of soils are important factors in natural and managed groundwater infiltration (recharge) and are therefore an important component of a hydrogeologic system. Soil hydrologic group data from the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database (SSURGO) (NRCS 2019) are shown on **Figure 3-4**. The soil hydrologic group is an assessment of soil infiltration rates determined by the water transmitting properties of the soil, which include hydraulic conductivity and percentage of clays in the soil, relative to sands and gravels. The groups are defined as:

- Group A – High Infiltration Rate: water is transmitted freely through the soil; soils typically less than 10 percent clay and more than 90 percent sand or gravel.
- Group B – Moderate Infiltration Rate: water transmission through the soil is unimpeded; soils typically have between 10 and 20 percent clay and 50 to 90 percent sand.
- Group C – Slow Infiltration Rate: water transmission through the soil is somewhat restricted; soils typically have between 20 and 40 percent clay and less than 50 percent sand.
- Group D – Very Slow Infiltration Rate: water movement through the soil is restricted or very restricted; soils typically have greater than 40 percent clay, less than 50 percent sand.

The hydrologic group of the soil generally correlates with the potential for infiltration of water to the subsurface. However, there is not necessarily a correlation between the soils at the ground surface and the underlying geology or hydrogeology.

3.4. GEOLOGIC SETTING

The Basin is located within one of the structural blocks of the Peninsular Ranges of Southern California. The Basin occurs in a linear low-lying block, referred to as the Elsinore-Temecula trough, between the Santa Ana Mountains on the west and the Perris Plain on the east (Norris and Webb 1990). The trough extends from Corona to the southeast some 30 miles and was formed along an extensive northwest-southeast trending fault zone including the Elsinore, Chino, and related faults. The Elsinore fault zone, including the Glen Ivy Fault, bound the Basin on the west and trend along the mountain front.

As shown on **Figure 3-5**, the oldest rocks in the Study Area crop out in the Santa Ana Mountains. These uplands are composed principally of volcanic (including the Santiago Peak Volcanics) and metamorphic rocks (including the Bedford Canyon Formation) of Jurassic and Cretaceous age. A thin rim of younger sedimentary units of Tertiary age crops out along the mountain front generally lying east of the Glen Ivy Fault within the Elsinore Fault Zone.

This zone of sedimentary units broadens to the north and contains numerous mapped formations of Cretaceous and Tertiary age. The northeastern side of the valley is flanked primarily by granitic rocks of Cretaceous age. Erosion of these units has filled in the trough over time resulting in quaternary-age alluvial fan, channel, and other deposits making up the permeable portions of the groundwater Basin (Todd and AKM 2008).

The Elsinore Fault Zone forms a complex series of pull-apart basins (Morton and Weber 2003). The deep portion of the Basin in the Coldwater area is one of these pull-apart basins. Pull-apart basins are topographic depressions that form at releasing bends or steps in basement strike-slip fault systems. This initial deposition into the Basin is composed of rapid deposition of landslide and debris flow deposits which are extremely poorly sorted with a mixture of clay, sand, gravel, and boulders as seen in deep well logs. Since the movement on the faults is right-lateral, the oldest sediments are located at the lower levels in the northern part of the Basin. As the pull-apart basin formed, progressively younger sediments have been deposited from north to south. Because of this type of deposition, the lower units of the pull-apart basin can be heterogeneous.

3.5. FAULTS

The Glen Ivy fault zone separates the Bedford area from the Coldwater area, having significant impact on the depth of the basin and thickness of alluvial units. The Coldwater area of the Basin is located within a pull-apart basin between the Glen Ivy fault and the Elsinore Fault Zone located at the base of the Santa Ana Mountains. Within the basin, the Glen Ivy faults truncate and offset the alluvial units by up to 250 feet. This offset is inferred from well logs that extend to bedrock near the fault (Todd and AKM 2008 and WEI 2015b).

The Glen Ivy fault limits deep groundwater flow, resulting in a limitation of the hydraulic connection between the Coldwater and Bedford areas. At depth, the offset geologic units place the alluvial deposits in the Coldwater area against the Tertiary Bedford Canyon Formation. When groundwater levels in the Coldwater area are low, there is reduced groundwater flow across the fault. This is especially apparent during the recent periods when the groundwater levels in the Coldwater area were especially low. During these low water periods in the Coldwater area, groundwater levels are higher across the fault in the Bedford area resulting in minor inflows from Bedford into the Coldwater area. This is shown in some recent groundwater level data and supported by the groundwater modeling (**Appendix E**). However, at shallower depths, the fault offset is across alluvial deposits. During periods, or areas, when groundwater levels in the Coldwater area are high, groundwater elevation data suggests these areas appear to be well-connected when groundwater elevations in the Basin are high (Todd and AKM 2008), indicating more compartmentalization with depth. However, there is insufficient groundwater elevation monitoring information to assess the extent of this potential barrier to flow and it is therefore not considered a complete barrier to groundwater flow in the Basin.

3.6. PRINCIPAL AQUIFER

The following is a summary of the principal aquifer in the Basin, including the source and character of the sediments, lateral boundaries, and faults that potentially affect groundwater flow through the principal aquifer.

3.6.1. Description of Principal Aquifer

The principal aquifer of the Bedford-Coldwater Basin is composed of alluvium, including alluvial fan, alluvial valley, axial channel, and wash deposits. These deposits are sourced from the Santa Ana Mountains to the west of the Basin and the Peninsular Ranges to the east of the Basin. The Bedford Canyon Formation (a slightly metamorphosed sedimentary formation composed of interlayered argillite, slate, graywacke, conglomeratic graywacke, impure quartzite, and small masses of limestone and quartz-rich metasandstone) and adjacent granitic rocks are the primary source materials for these alluvial deposits. The alluvial fan deposits in the Coldwater area extend into the Bedford area and appear to have been disrupted by faulting (**Figure 3-5**). Channel deposits along Temescal Wash and local tributaries define the eastern boundary of the Basin. In the northern Bedford area, a variety of Tertiary sedimentary units crop out including the Silverado (Paleocene), Vaqueros (Miocene), Topanga (Miocene), and Puente (Miocene) formations (**Figure 3-5**). The alluvial aquifer materials in this portion of the Basin are sourced from these Tertiary sedimentary units. As such, the character of the deposits and the groundwater chemistry differ from the alluvial fans in the Coldwater area and those to the north in the Temescal Subbasin and south in the Elsinore Groundwater Basin.

Both older and recent alluvial fans have been deposited along the mountain front on the western edge of the Basin. These fans have prograded across both the Coldwater and Bedford areas from west to east. Although these deposits are relatively thick, the entire unit is heterogeneous. Sand lenses within the fan deposits collectively form the Alluvial Fan Aquifers. These aquifers from less than 40 feet up to 500 feet in the Bedford area (eastern portion of the Basin) and up to 800 feet in thickness in the deepest portions of the Coldwater area (western portion of the Basin) (Todd and AKM 2008).

3.6.2. Description of Lateral Boundaries

The bedrock units of the uplands provide distinct lateral boundaries for the basin and its alluvial units. Basin alluvium is thin in some areas, which in itself impedes groundwater flow. This is especially relevant at the northern and southern boundaries of the Basin.

3.7. DEFINABLE BASIN BOTTOM

The Basin bottom is defined by bedrock, which is shallow around the perimeter and deep in the center. Depth to bedrock ranges in depth from 10 feet to over 700 feet (Todd and AKM 2008 and WEI 2015b). The depth to the bottom of the alluvial materials in the Basin and the contact with the bedrock bottom of the Basin are shown in the contours presented in **Figure**

3-6. Aquifer thickness is greatest in the Coldwater portion of the Basin west of the Glen Ivy fault, as shown in **Figures 3-6** and **3-8**.

3.8. CROSS SECTIONS

Figure 3-7 is a map showing locations of two cross sections, **Figures 3-8** and **3-9**. The two hydrogeologic cross sections were constructed to identify hydrogeologic structures affecting groundwater, to characterize the thickness and distribution of aquifer sediments within the Basin, and to confirm aquifer descriptions presented above.

The cross sections and depth to bedrock map were prepared using available information from existing datasets and sources including the following:

- Surficial geology in geographic information system (GIS) coverage format (USGS 2004 and 2006).
- Fault locations and orientations (USGS 2004 and 2006).
- Lithologic and well construction logs from local agencies.
- Drillers Log files from California Department of Water Resources (DWR).
- National Elevation Dataset (NED) ground surface digital elevation model data for Riverside County (USGS 2019).

The two cross sections (**Figures 3-8** and **3-9)** show the bedrock profile, location of faults, nature and maximum thickness of the alluvial fan aquifers and the relationship with the Temescal Wash deposits. Locations and general construction of wells also are shown. As indicated, alluvial sediments are more than 800 feet thick in the Coldwater area and up to 500 feet thick in the Bedford area, with the thickest section occurring near the Glen Ivy Fault. The cross sections are consistent with and support the conceptual model described above and the depth to bedrock (**Figure 3-6**).

3.9. STRUCTURES AFFECTING GROUNDWATER

The Basin is defined by the lateral extents of the alluvial material in the pull-apart basin described above. This material is bounded by bedrock in the Santa Ana Mountains on the west and the Peninsular Ranges to the east. The southern and northern boundaries of the Basin are formed by areas of thin alluvial material over shallow bedrock in narrow valleys (Todd and AKM 2008 and WEI 2015b). Within the Basin the groundwater is affected by faulting in the Elsinore Fault Zone, primarily the Glen Ivy fault as described in Section 3.5 above.

3.10. RECHARGE AND DISCHARGE AREAS

Areas of major recharge and discharge are shown in **Figure 3-10**. Recharge to the Basin occurs primarily from infiltration of runoff, and to a lesser extent from deep percolation of precipitation and urban return flows, wastewater recharge, and subsurface inflow from outside the Basin.

Most of the Basin recharge comes from the infiltration of runoff from precipitation in the Santa Ana Mountains west of the Basin and the Peninsular Ranges east of the Basin. Large amounts of runoff from the mountains flow into unlined channels and the shallow subsurface at the edges of the Basin and then on into and through the Basin. The amount of water available for recharge varies annually with changes in rainfall and runoff. Runoff into the Basin is subject to evapotranspiration, infiltration, and continued surface flow to and in the Temescal Wash. The watersheds contributing to the Basin include multiple drainages, all of which flow across the Basin in generally east-west orientations. Wet years generate large amounts of water that exceed the recharge capacity of the Basin (Todd and AKM 2008).

Deep percolation of precipitation is the process by which precipitation enters groundwater. Recharge to groundwater from deep percolation occurs throughout the Basin (Todd and AKM 2008).

Return flows are those portions of applied water (e.g., landscape irrigation) that are not consumed by evapotranspiration and returned to the groundwater system through deep percolation or infiltration. Return flows associated with urban, industrial, and agricultural water uses all have the potential to contribute to recharge to the Basin (Todd and AKM 2008).

Recharge associated with wastewater occurs with discharges from the wastewater treatment facilities within and upstream from the Basin (TVWD water reclamation facility [WRF] and Corona WRF-3, and Horsethief Canyon WRF, respectively; see **Figure 4-14** for locations) and from on-site wastewater treatment systems (OWTS). Subsurface inflow occurs along the Basin boundaries both through bedrock inflow along the western and eastern Basin boundaries and from the Elsinore Subbasin to the south, but these are not considered to be a significant source of recharge to the Basin (Todd and AKM 2008).

Discharge from the Basin is almost entirely from groundwater pumping (see well locations on Figure 3-1), evapotranspiration, and mining operations (quarries on **Figure 3-10**). There is some limited discharge across the northern Basin boundary with the Temescal Subbasin of the Upper Santa Ana River Basin, but the thin alluvial material in this area limits the volume and timing of subsurface outflow along this boundary (Todd and AKM 2008 **Appendix E**).

3.11. PRIMARY GROUNDWATER USES

The primary groundwater uses in the Basin are municipal pumping, with limited private pumping for small water system, commercial, and residential users. Groundwater use estimates are included in Section 5, Water Budget.

3.11.1. Bedford Area

Groundwater in the principal aquifer in the Bedford area is primarily used for non-potable municipal and irrigation water supply. There are no known potable water supply wells in the Bedford area.

3.11.2. Coldwater Area

The principal aquifer in the Coldwater area is mostly used for municipal water supply. Most of the pumping in this area is from wells owned and operated by the BCGSA agencies, with some additional pumping by small community water system and small commercial users. Non-potable pumping has occurred historically in this area to support agricultural, recreational, small residential, and industrial water uses.

3.12. DATA GAPS IN THE HYDROGEOLOGIC CONCEPTUAL MODEL

The hydrogeologic conceptual model has not identified data gaps in available information that affect the assessment of sustainability in the Basin.

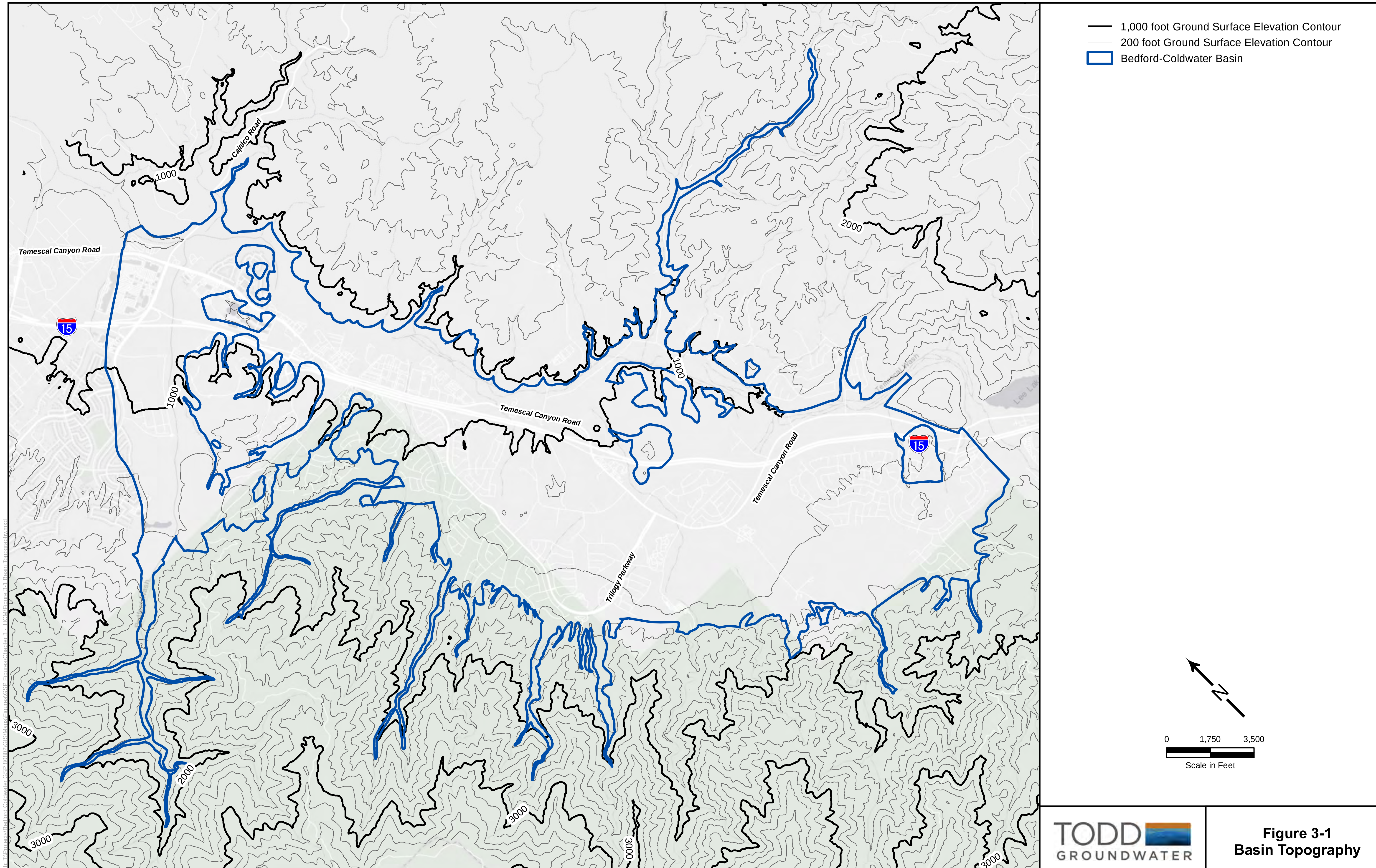


Figure 3-1
Basin Topography

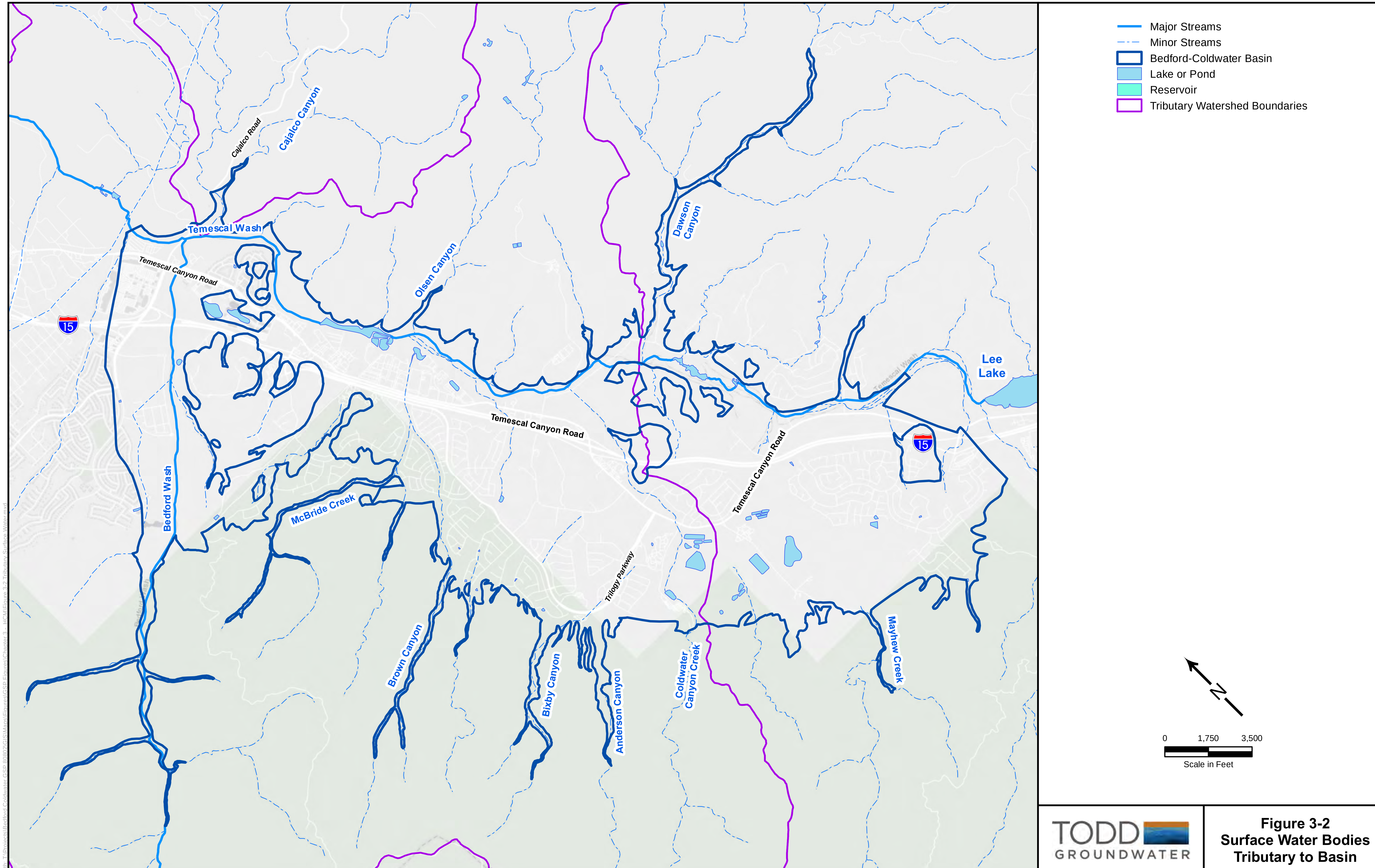
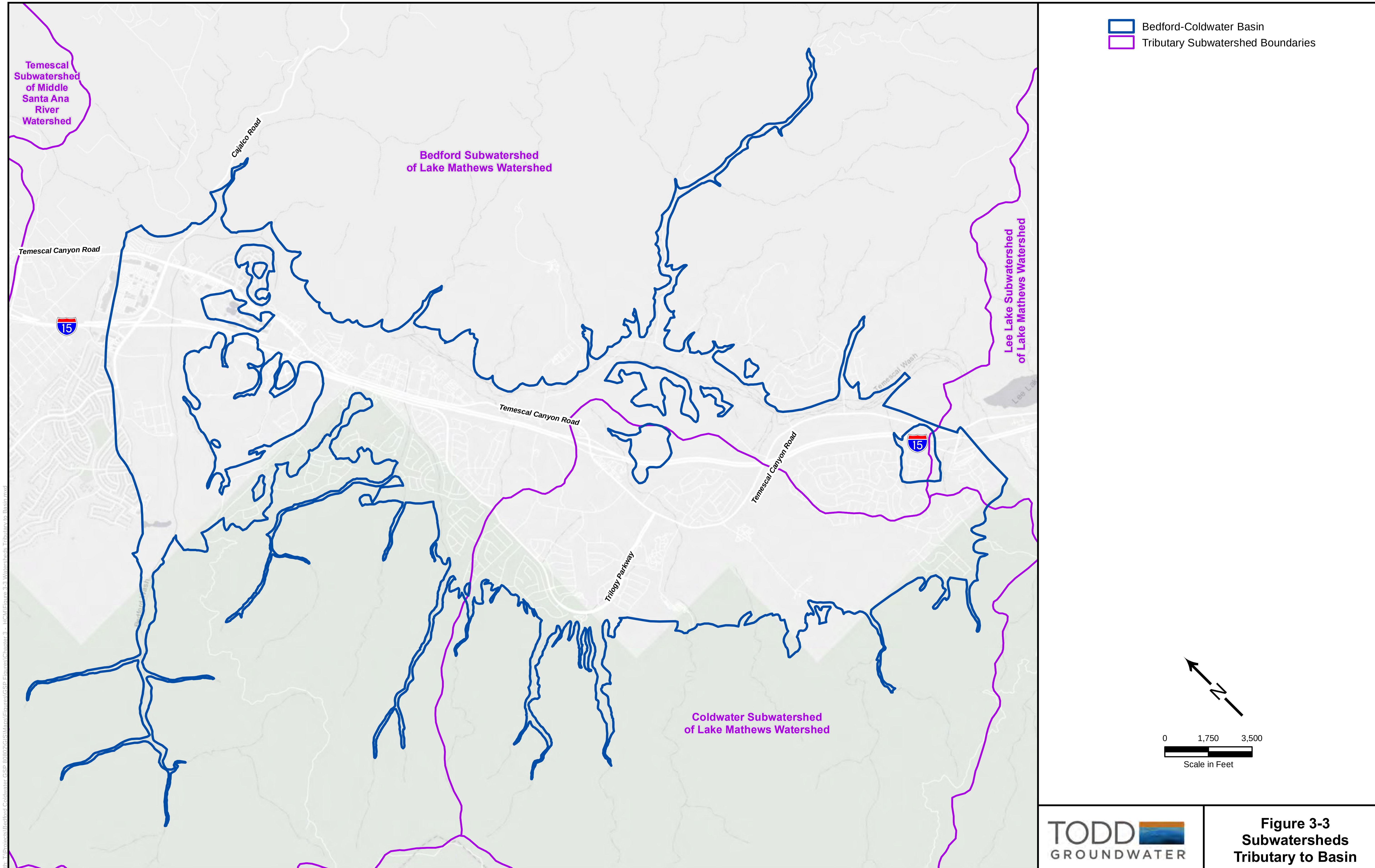
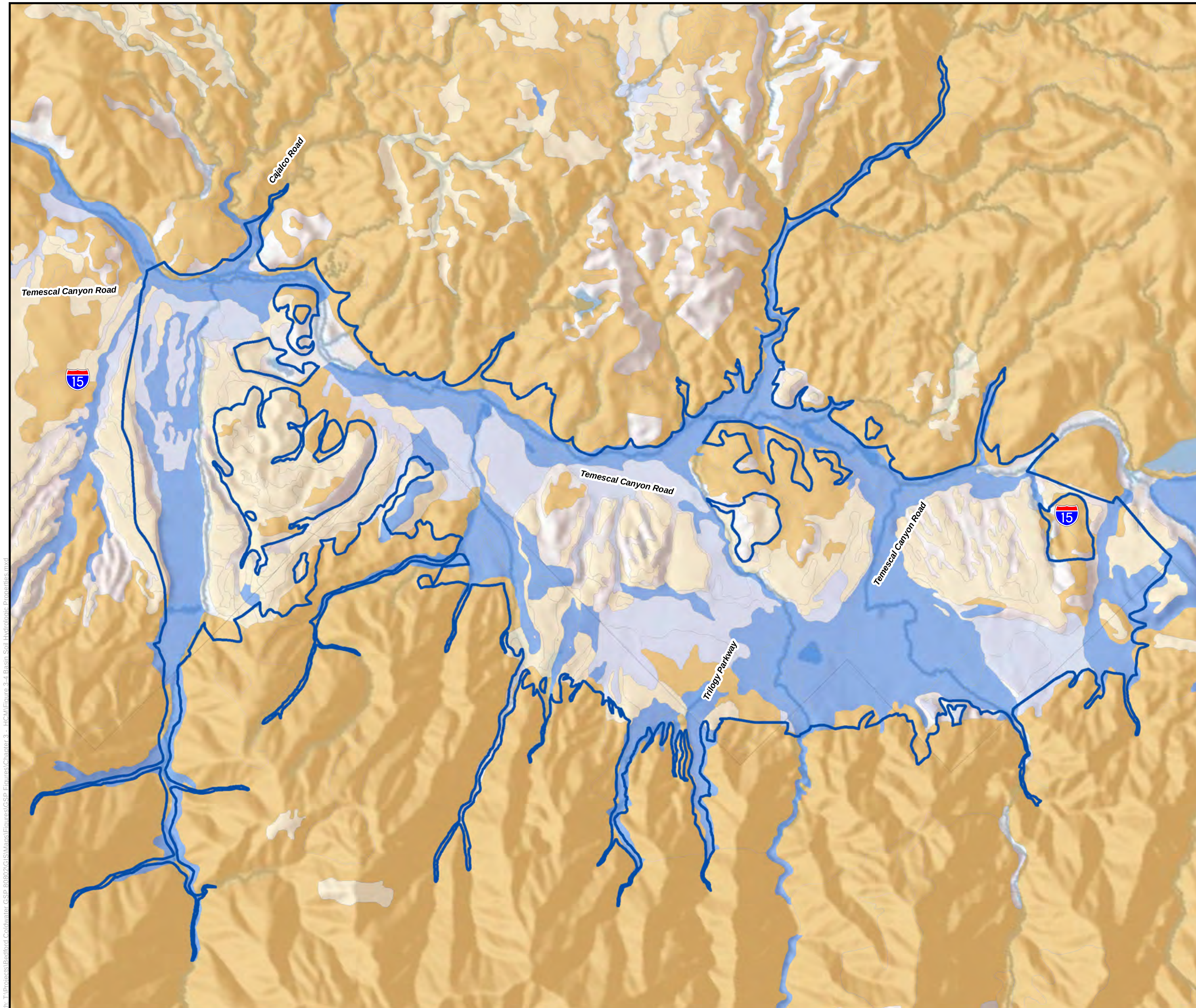


Figure 3-2
Surface Water Bodies Tributary to Basin



TODD GROUNDWATER

Figure 3-3 Subwatersheds Tributary to Basin



Soil Hydrologic Group

- A: High Infiltration Rate
- B: Moderate Infiltration Rate
- C: Slow Infiltration Rate
- D: Very Slow Infiltration Rate
- No Data
- Bedford-Coldwater Basin

N

0 1,750 3,500
Scale in Feet

Source:
Natural Resources Conservation Service (NRCS), 2019,
SSURGO soil survey online map database available at
http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
last accessed September 2019.

TODD GROUNDWATER

Figure 3-4
Basin Soil
Hydrologic Properties

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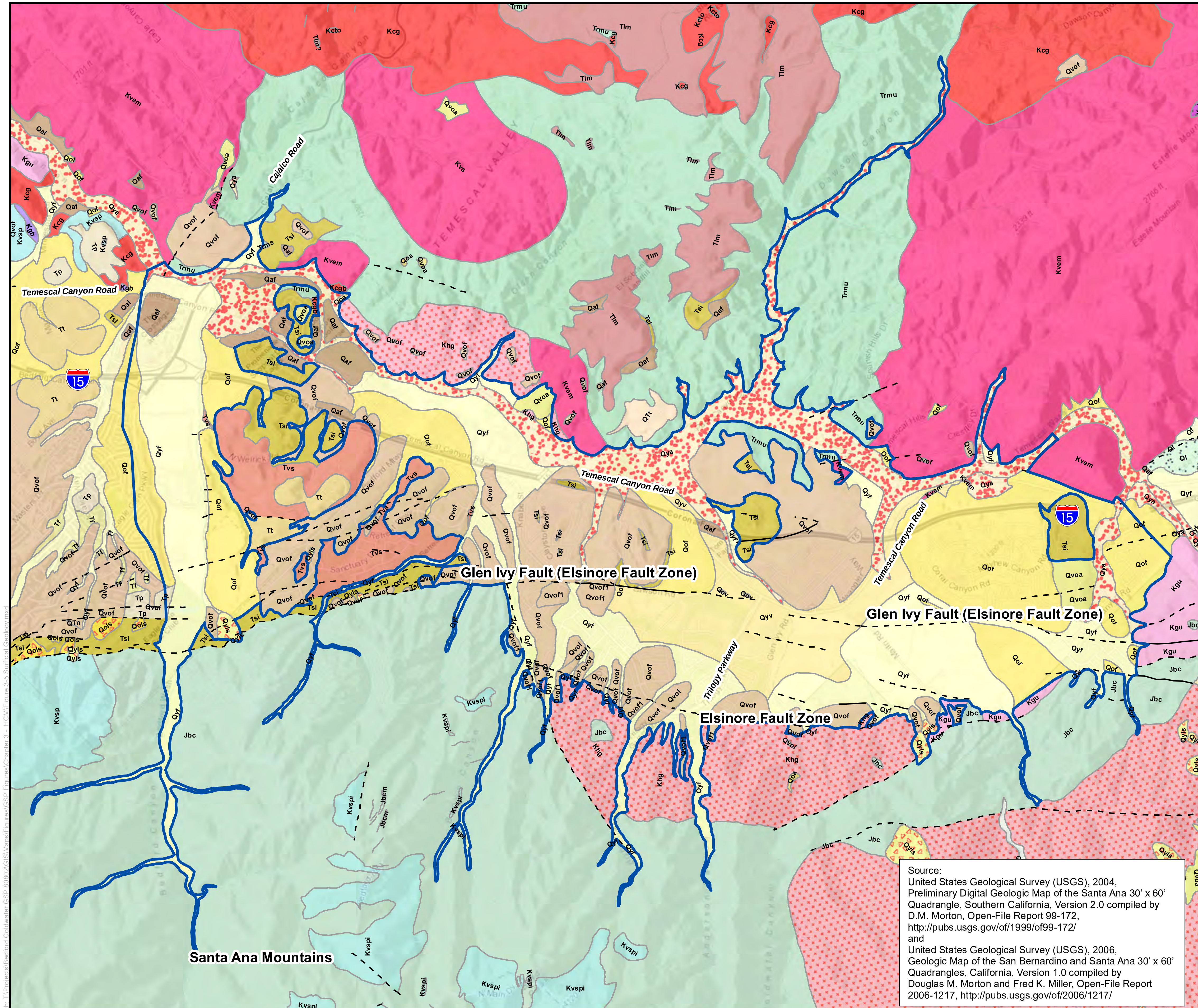


Bedford-Coldwater Basin
Fault Location, dashed where uncertain
Qaf, Artificial fill
Qw, Very young wash deposits
Qf, Very young alluvial-fan deposits
Ql, Very young lacustrine deposits
Qyw, Young wash deposits
Qyf/Qyf1, Young alluvial-fan deposits
Qya, Young axial-channel deposits
Qyv, Young alluvial-valley deposits
Qyls, Young landslide deposits
Qof, Old alluvial-fan deposits
Qoa, Old axial-channel deposits
Qov, Old alluvial-valley deposits
Qols, Old landslide deposits
Qvof, Very old alluvial-fan deposits
Qvoa, Very old axial-channel deposits
QTt, Conglomerate of Temescal area
QTn, Sedimentary rocks of Norco area
Tf, Fernando Formation
Tp, Puente Formation
Tlm, Lake Mathews Formation
Tcgr, Rhyolite-clast conglomerate of Lake Mathews area
Tt, Topanga Group
Tvs/Tvss, Vaqueros and Sespe Formations, undifferentiated
Tsi, Silverado Formation
Kgg/Kgt/Kgtf/Kgti/Kgh/Kgh/Kght, Gavilan Ring Complex
Katg, Granodiorite of Arroyo del Toro Pluton
Kcto/Kcg/Kcgd/Kct/Kcgq/Kcgb, Cajalco Pluton
Kgu, Granite, undifferentiated
Kgb, Gabbro, undifferentiated
Khg, Heterogeneous granitic rocks
Kvsp/Kvspi, Santiago Peak Volcanics
Kvem/Kvr/Ksv/Kvs, Estelle Mountain volcanics of Herzig
Jbc/Jbcm, Bedford Canyon Formation
Trms/Trmu, Rocks of Menifee Valley

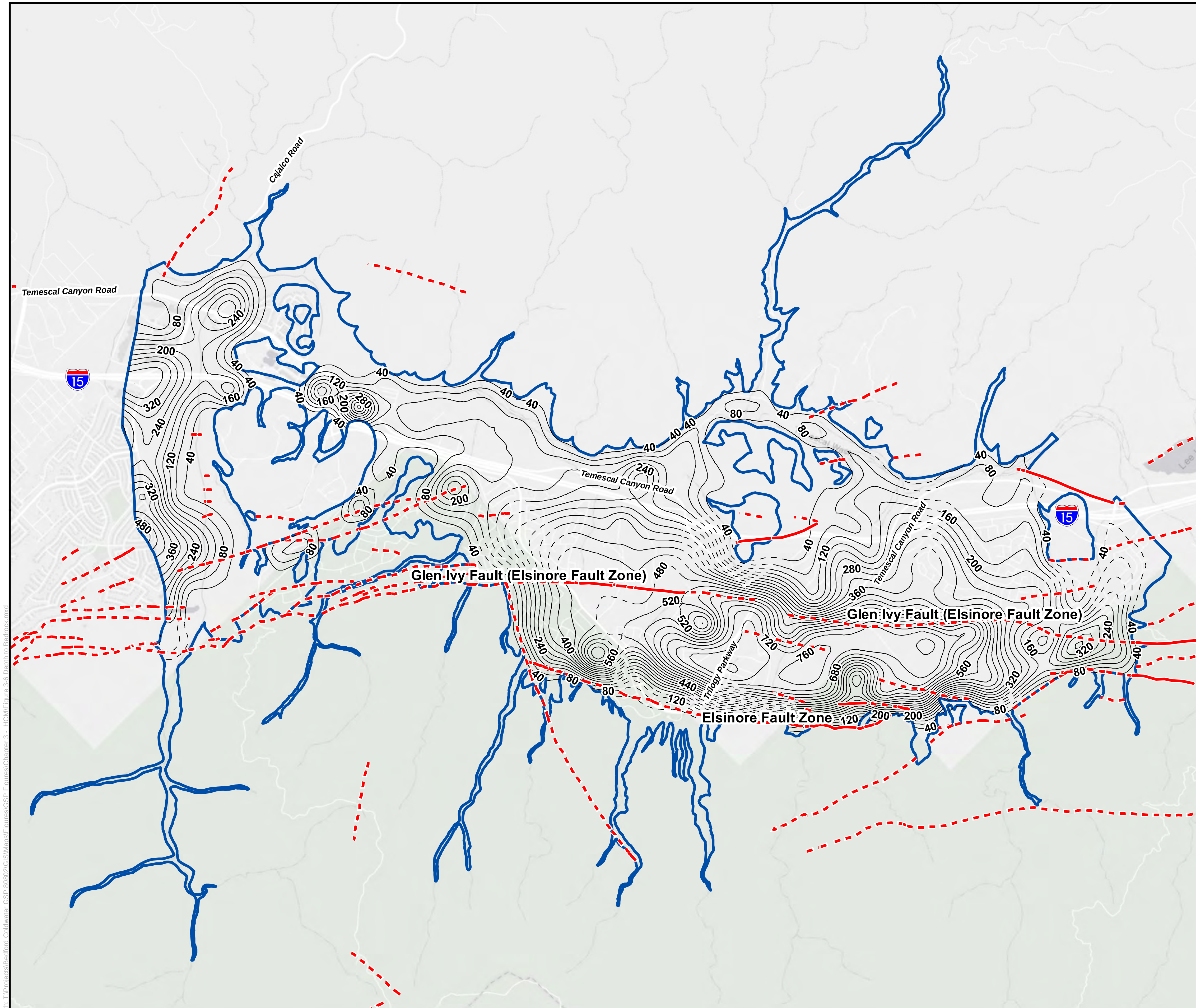
N

0 1,750 3,500
Scale in Feet

Source:
United States Geological Survey (USGS), 2004, Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0 compiled by D.M. Morton, Open-File Report 99-172, http://pubs.usgs.gov/of/1999/of99-172/
and
United States Geological Survey (USGS), 2006, Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles, California, Version 1.0 compiled by Douglas M. Morton and Fred K. Miller, Open-File Report 2006-1217, http://pubs.usgs.gov/of/2006/1217/

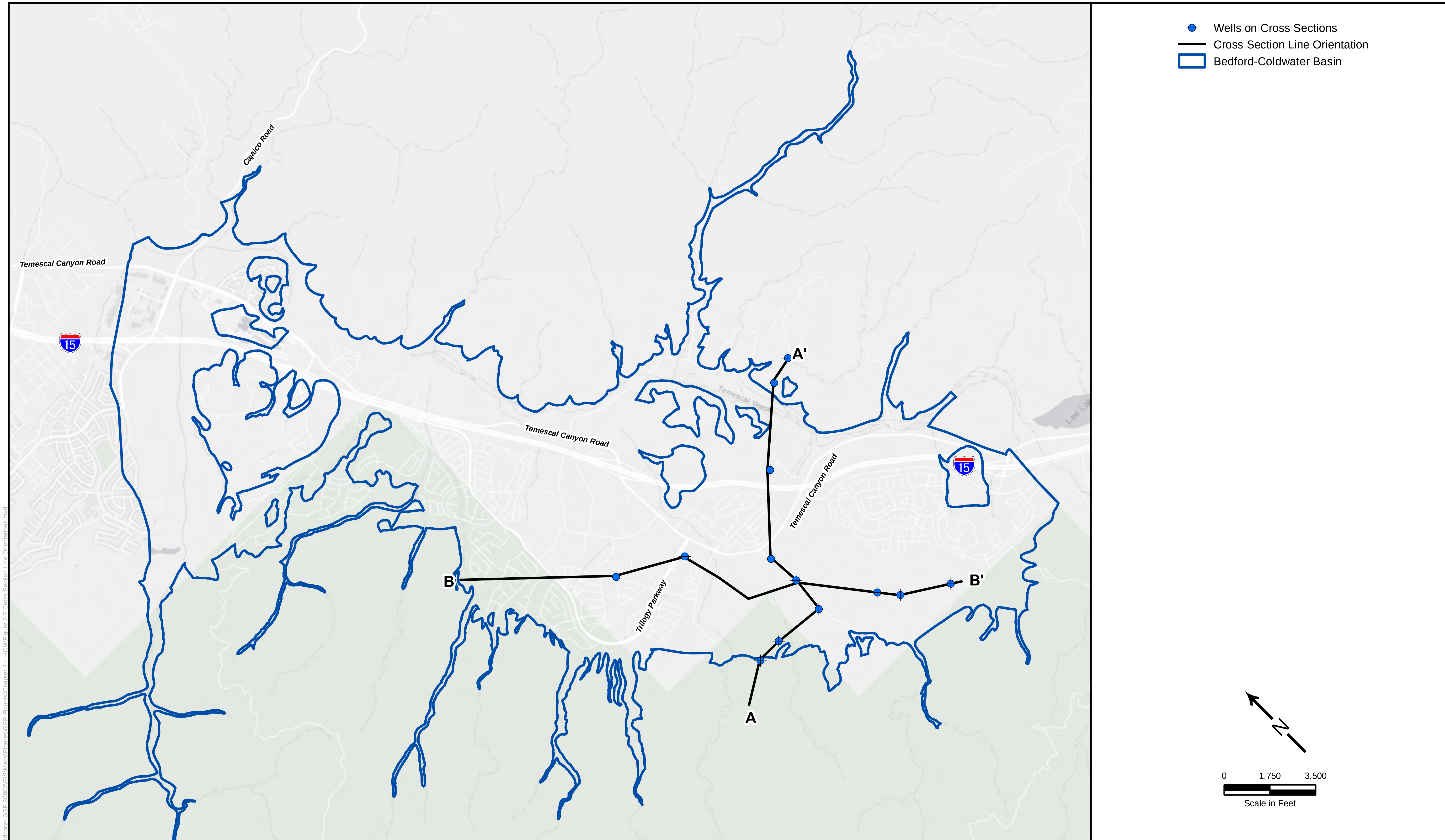
TODD GROUNDWATER

Figure 3-5
Surficial Geology



TODD GROUNDWATER

Figure 3-6
Depth to Bedrock



TODD GROUNDWATER

Figure 3-7
Cross Section Line Orientation

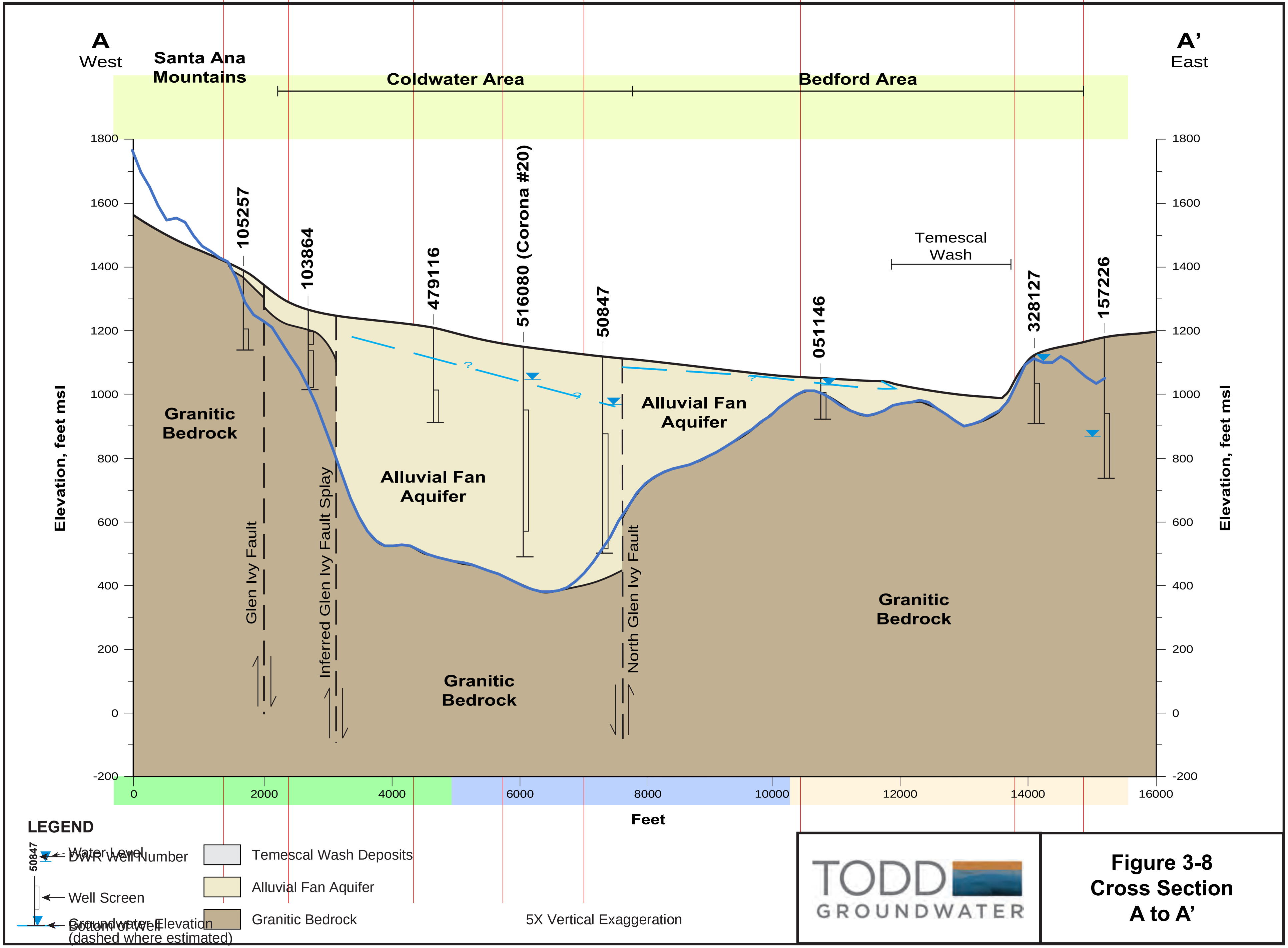
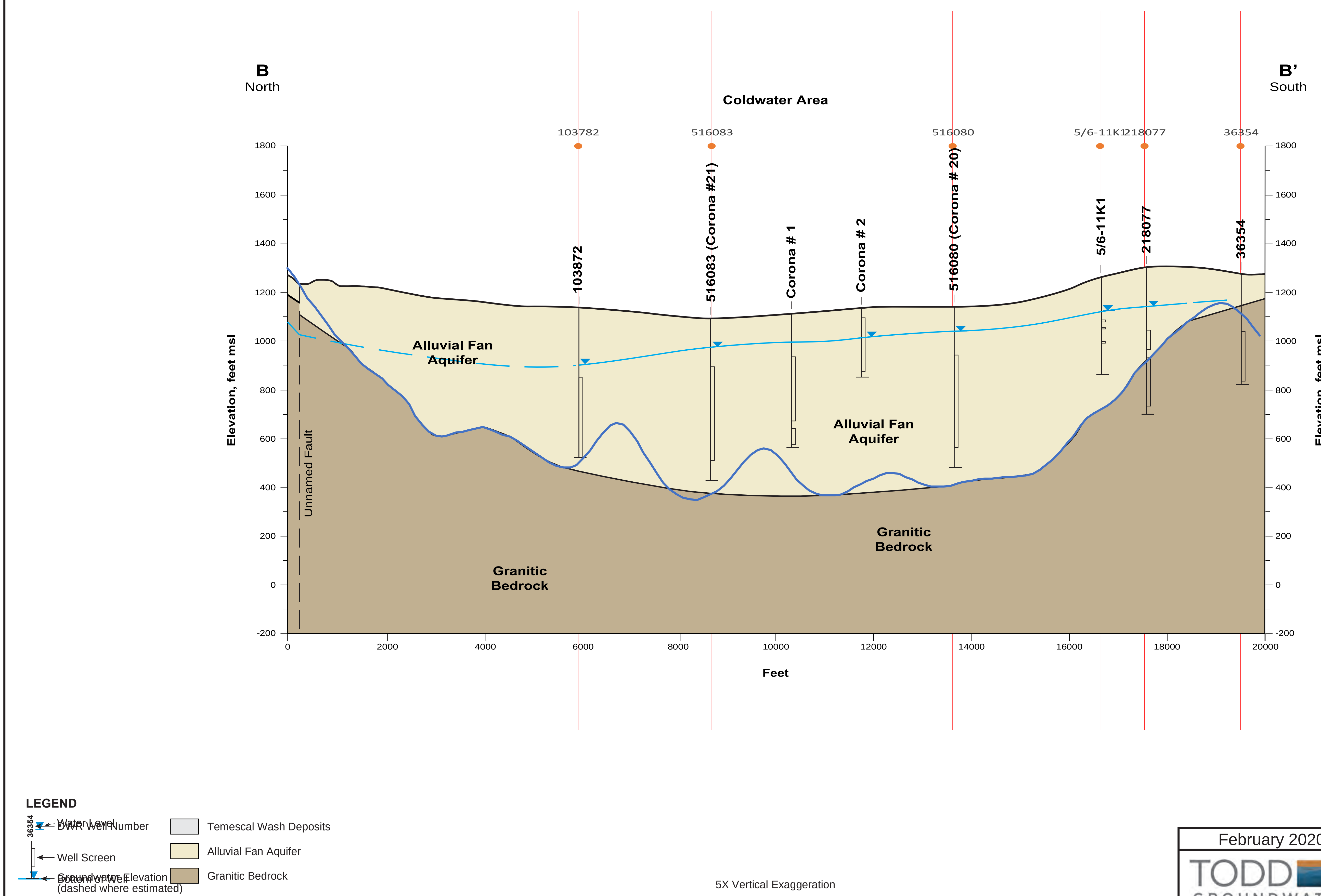


Figure 3-8
Cross Section
A to A'



February 2020

TODD GROUNDWATER

Figure 3-9
Cross Section
B to B'

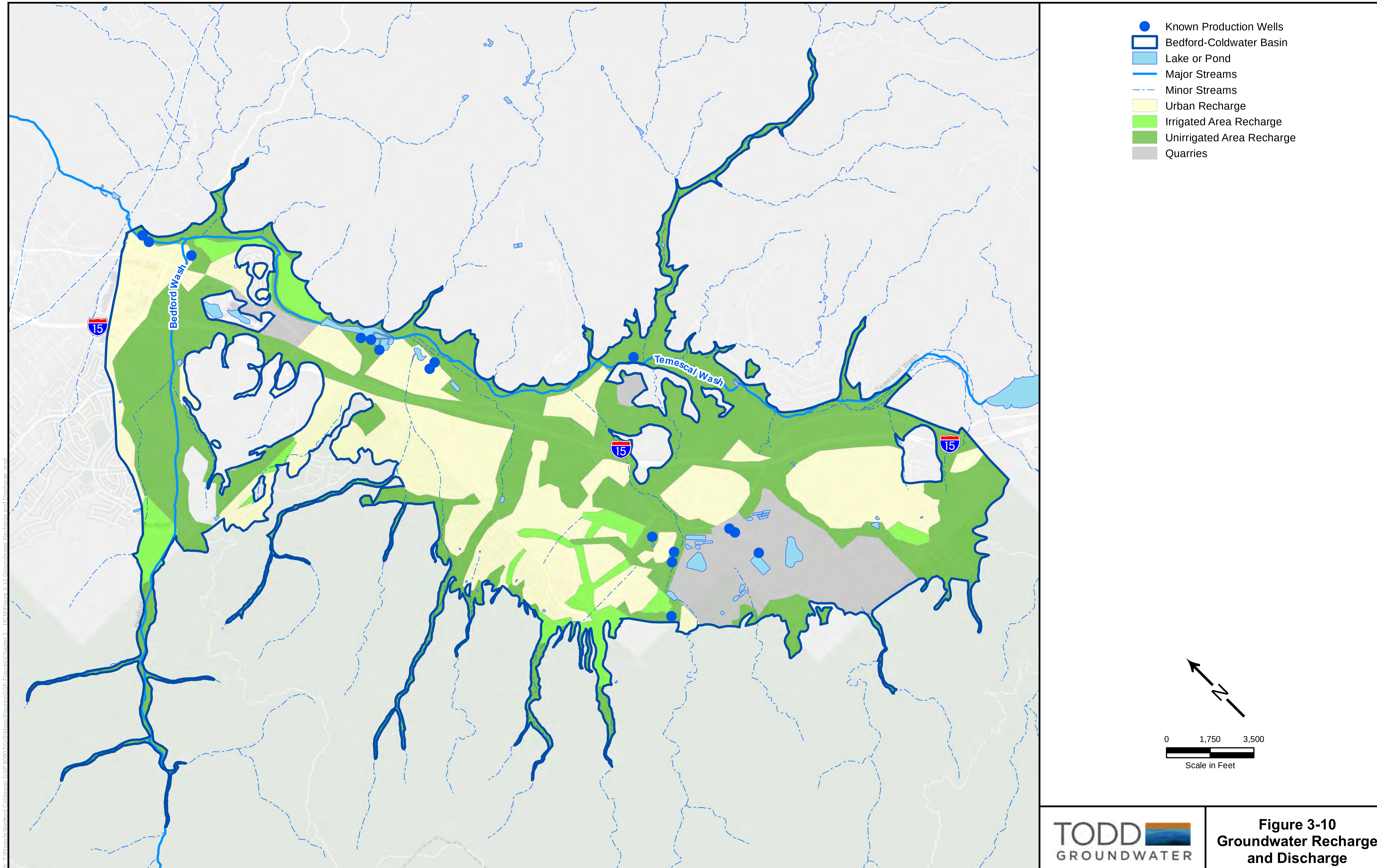


Figure 3-10
Groundwater Recharge and Discharge

4. CURRENT AND HISTORICAL GROUNDWATER CONDITIONS

The Sustainable Groundwater Management Act (SGMA) requires definition of various study periods for current, historical, and projected future conditions. Current conditions, by SGMA definition, include those occurring after January 1, 2015 and accordingly, historical conditions occurred before that date. A historical period must include at least 10 years.

The study period 1990 through 2018 is based on the cumulative departure from mean precipitation at Santiago Peak, Lake Elsinore, and Riverside climate monitoring stations. This period is representative and includes droughts and wet years, with an average annual rainfall of 12.97 inches, comparable to the long-term average of 12.9 inches (1875 to 2017). Accordingly, groundwater conditions over time are described through 2018.

Groundwater conditions are described in terms of the six sustainability indicators identified in SGMA; these include:

- Groundwater elevations.
- Groundwater storage.
- Potential subsidence.
- Groundwater quality.
- Seawater intrusion (which is not likely to occur in this inland basin).
- Interconnected surface water and groundwater dependent ecosystems.

4.1. GROUNDWATER ELEVATIONS

4.1.1. Available Data

Groundwater elevation records were collected from multiple sources, including previous investigations, City of Corona, United States Geological Survey (USGS) National Water Information System (NWIS), California Department of Water Resources (DWR), and California Statewide Groundwater Elevations Monitoring (CASGEM). Data from these sources were collected, reviewed, and compiled into a single unified groundwater elevation dataset. The wells with water level measurement records are shown on **Figure 4-1**.

4.1.2. Groundwater Occurrence

As summarized in Chapter 3, groundwater is present in one principal aquifer. Groundwater in the Bedford-Coldwater Subbasin (Basin) occurs under unconfined conditions and there are no data to suggest distinct vertical zones or to provide zone-specific groundwater elevation hydrographs or maps.

4.1.3. Groundwater Elevations and Trends

Hydrographs showing groundwater elevation trends over time were prepared for all 28 wells with elevation data in the Basin; these hydrographs then were reviewed to identify wells with long term data that could be used to present representative hydrographs. The selection of representative wells was based on a quantitative approach that considered hydrographs with long records characteristic of an area and distribution of wells across the Basin. All available groundwater elevation data were plotted as hydrographs and well locations were plotted on a basin-scale map. All wells with water level data are shown in **Figure 4-1**. Long term changes in groundwater elevations in the Basin are illustrated in representative hydrographs shown in **Figures 4-2 through 4-6** and show conditions since January 1990, where available, thus showing the study period for the Groundwater Sustainability Plan (GSP).

Representative wells with long term hydrographs were selected based the following criteria:

- Location – Wells were prioritized considering broad distribution across the Basin and availability of other wells nearby.
- Ongoing and/or recent monitoring – Wells were selected that are part of the active monitoring network or have recent data.
- Trends – Each hydrograph was assessed for continuity of monitoring, representation of local or regional trends, and presence of outliers or unrealistic data.

The northern hydrograph wells in **Figure 4-2** through **4-5** all reflect stable groundwater level conditions. These four wells show a slight decrease during the 2013 through 2015 drought but the net change is only 20 to 30 feet. The southernmost well, Corona 3 on **Figure 4-6** shows conditions in the Coldwater area where there is more variation than other areas of the Basin. As shown on the hydrograph, water levels have declined over the last 24 years with significant fluctuations in response to wet and dry cycles. Water levels in the Coldwater area have varied more than 350 feet over the last 30 years with multiple major and minor cycles of groundwater elevation decline and recovery, as illustrated on the hydrograph. Some of the short-term fluctuations may have been influenced by incomplete recovery of pumping water levels in the well. The wide water level fluctuations over time in the Coldwater area likely reflect the relatively small footprint and fault-controlled flow along with the fact that most of the pumping in the Basin occurs in this area. Although long-term declines in groundwater elevations have occurred in Coldwater in the past, recent groundwater elevations have stabilized due in part to shared management of the Basin between the three Bedford-Coldwater Groundwater Sustainability Agency (BCGSA) agencies.

Recent water levels in the Coldwater area are just below 800 feet msl (as shown on **Figure 4-6**) and reflect a recovery of approximately 60 feet from the historical low reached in late 2010. This recovery is due, in part, to a production agreement between the City of Corona (Corona) and Elsinore Valley Municipal Water District (EVMWD) for the Coldwater portion of the Basin, where most of the pumping occurs.

4.1.4. Groundwater Flow

Figures 4-7 and 4-8 are groundwater elevation contour maps constructed to examine current groundwater flow conditions and using data from fall 2015 and spring 2018, respectively. Contours were developed based on available groundwater elevation data for all wells and information from the numerical groundwater model (**Appendix E**). The fall 2015 groundwater elevation contours (**Figure 4-7**) show flow generally from south to north in the Basin and from the northwest to the northeast in the north of the Basin. A slight water table depression occurs in the Coldwater area around the active production wells. Water levels in the Bedford area near the Glen Ivy fault were higher than those across the fault in the Coldwater area, indicating flow from Bedford to Coldwater. The groundwater elevations in this period represent relatively dry conditions at the end of the most recent drought period. Spring 2018 groundwater elevation contours (**Figure 4-8**) also show flow generally south to north with easterly flow in the north of the Basin and a small depression in the Coldwater area. Spring 2018 followed a period of relatively wet conditions. However, water levels in the Basin were very similar to those during the fall 2015 dry conditions. This includes the depression in the Coldwater area and the indication of flow from Bedford to Coldwater across the Glen Ivy Fault. Both fall 2015 and spring 2018 contours show that groundwater elevations are relatively consistent.

4.1.5. Vertical Groundwater Gradients

The current monitoring network for groundwater elevations provides little information about vertical head (groundwater elevation) gradients within the Basin. Available data are almost entirely from water supply wells, which are typically screened between 200 and 500 feet below ground surface (bgs). The potentiometric head at the depth of the well screens can be different from the true water table, which is the first zone of saturation reached when drilling down from the ground surface.

4.2. CHANGES IN GROUNDWATER STORAGE

Change in storage estimates based on evaluation of groundwater elevation changes and water budget inflow and outflow have completed for the portions of the Basin in past studies (MWH 2004, SAIC 2007, WEI 2015a, 2015b, 2016, 2017b, and 2019). Such storage change estimates are based on available groundwater elevation data that are limited geographically and temporally and thus include uncertainty. In addition, the storativity, or storage coefficient (the volume of water released from storage per unit decline in hydraulic head), is largely unknown across the Basin. The volume of groundwater storage change over time can be calculated by multiplying the groundwater elevation changes during a period by the storage coefficient. Storage coefficient value and storage change estimates for the Basin have been developed through calibration of the numerical model, as described in **Appendix E**. Therefore, the numerical model is the best tool for estimating groundwater storage changes. The resulting change in storage estimates are presented in the Water Budget chapter.

4.3. LAND SUBSIDENCE AND POTENTIAL FOR SUBSIDENCE

Land subsidence is the differential lowering of the ground surface, which can damage structures and facilities. This may be caused by regional tectonism or by declines in groundwater elevations due to pumping. The latter process is relevant to the GSP. While subsidence has not been a known issue in the Basin, groundwater elevation declines in the subsurface, resulting in dewatering and compaction of predominantly fine-grained deposits (such as clay and silt) can cause the overlying ground surface to subside.

This process is illustrated by two conceptual diagrams shown on **Figure 4-9**. The upper diagram depicts an alluvial groundwater basin with a regional clay layer and numerous smaller discontinuous clay layers. Groundwater elevation declines associated with pumping cause a decrease in water pressure in the pore space (pore pressure) of the aquifer system. Because the water pressure in the pores helps support the weight of the overlying aquifer, the pore pressure decrease causes more weight of the overlying aquifer to be transferred to the grains within the structure of the sediment layer. If the weight borne by the sediment grains exceeds the structural strength of the sediment layer, then the aquifer system begins to deform. This deformation consists of re-arrangement and compaction of fine-grained units[2], as illustrated on the lower diagram of **Figure 4-9**. The tabular nature of the fine-grained sediments allows for preferred alignment and compaction. As the sediments compact, the ground surface can sink, as illustrated by the right-hand column on the lower diagram of **Figure 4-9**.

Land subsidence due to groundwater withdrawals can be temporary (elastic) or permanent (inelastic). Elastic deformation occurs when sediments compress as pore pressures decrease but expand by an equal amount as pore pressures increase. A decrease in groundwater elevations from groundwater pumping causes a small elastic compaction in both coarse-and fine-grained sediments; however, this compaction recovers as the effective stress returns to its initial value. Because elastic deformation is relatively minor and fully recoverable, it is not considered an impact.

Inelastic deformation occurs when the magnitude of the greatest pressure that has acted on the clay layer since its deposition (preconsolidation stress) is exceeded. This occurs when groundwater elevations in the aquifer reach a historically low groundwater elevation. During inelastic deformation, or compaction, the sediment grains rearrange into a tighter configuration as pore pressures are reduced. This causes the volume of the sediment layer to reduce, which causes the land surface to subside. Inelastic deformation is permanent because it does not recover as pore pressures increase. Clay particles are often planar in form and more subject to permanent realignment (and inelastic subsidence). In general, coarse-grained deposits (e.g., sand and gravels) have sufficient intergranular strength and do not undergo inelastic deformation within the range of pore pressure changes encountered from groundwater pumping. The volume of compaction is equal to the volume of groundwater that is expelled from the pore space, resulting in a loss of storage capacity. This loss of storage capacity is permanent but may not be substantial because clay layers do not typically store significant amounts of usable groundwater. Inelastic compaction, however, may decrease the vertical permeability of the clay resulting in minor changes in vertical flow.

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[2] Although extraction of groundwater by pumping wells causes a more complex deformation of the aquifer system than discussed herein, the simplistic concept of vertical compaction is often used to illustrate the land subsidence process (LSCE et al. 2014).

The following potential impacts can be associated with land subsidence due to groundwater withdrawals (modified from LSCE et al. 2014):

- Damage to infrastructure including foundations, roads, bridges, or pipelines,
- Loss of conveyance in canals, streams, or channels,
- Diminished effectiveness of levees,
- Collapsed or damaged well casings, and
- Land fissures.

4.3.1. Interferometric Synthetic Aperture Radar (InSAR)

InSAR data are provided by DWR on its SGMA Data Viewer (DWR 2020) and document vertical displacement of the land surface across a broad area of California from June 13, 2015 to September 19, 2019. The accuracy of the InSAR ground surface elevation change estimates is reported to be ±16 millimeters (mm), or ±0.052 feet (ft) (Towill 2020). The TRE Altamira InSAR Dataset, shown on **Figure 4-10** shows mapping within the Basin for land surface deformation between 2015 and 2019.

The TRE Altamira InSAR data on **Figure 4-10** uses a range of 0.05 to -0.05 ft to display the estimated ground surface elevation change in the Basin. The maximum estimated ground surface elevation rise in the Basin between 2015 and 2019 is 0.02 ft and the maximum decline is -0.05 ft. These estimated changes are less than the reported accuracy for InSAR. Thus, based on the InSAR estimates there has effectively been no change in ground surface elevation within the Basin in the 2015 to 2019 period. Given these data and the understanding of the hydrogeological conceptual model, there is no evidence of subsidence at this time.

4.4. GROUNDWATER QUALITY

The natural quality (chemistry) of groundwater is generally controlled by the interaction between rainwater and rocks/soil of the vadose zone and aquifers (Drever 1988). As rainfall infiltrates through the soil column, changes in water chemistry occur as anions and cations are dissolved into the water. These changes are influenced by soil and rock types, weathering, organic matter, and geochemical processes occurring in the subsurface. Once in the groundwater system, changing geochemical environments continue to alter groundwater quality. A long contact time between the water and sediments may allow for more dissolution and more concentrated groundwater (Drever 1988). The natural groundwater quality in a basin is the net result of these complex subsurface processes that have occurred over time.

General mineral quality of groundwater is naturally poor, especially in the Bedford area, as indicated by relatively high concentrations of total dissolved solids and sulfate. This reflects in part the occurrence in the northern Bedford area of Tertiary sedimentary units, in contrast to the alluvial fans of the Coldwater area. The Corona Groundwater Management Plan evaluated the geochemistry of the Basin, and compared the Coldwater area to the Bedford area (Todd and AKM 2008). This evaluation showed the Coldwater area had a relatively high calcium-to-sodium ratio compared to groundwater in the Bedford area and downgradient

Temescal Basin. This relationship showed a difference in the source material in the aquifer in these two locations. The aquifer material in the Coldwater area is sourced from the granitic units in the Santa Ana Mountains, while the material in the Bedford area is sourced from the Tertiary sedimentary units that outcrop within that area and east of the Basin.

Groundwater quality can vary in the Basin; some areas have good water quality while other areas have high mineral concentrations, generally presenting as elevated total dissolved solids (TDS). High TDS concentration in groundwater can be naturally occurring and also the result of anthropogenic sources such as urban runoff, historical agricultural activities, and treated wastewater discharge. Nitrate was historically elevated in parts of the Basin, but recent concentrations have been relatively low. Natural nitrate levels in groundwater are generally very low, and elevated concentrations are associated with agricultural activities, septic systems, landscape fertilization, and wastewater treatment facility discharges.

Groundwater in the Basin has been impacted by human activities including agricultural, urban, and industrial land uses. State agencies with regulatory oversight for water quality in the Basin include the Santa Ana Regional Water Quality Control Board (RWQCB) and the State Water Resources Control Board (SWRCB) – Division of Drinking Water (DDW).

4.4.1. Monitoring Networks

State Water Board GAMA Program

The State Water Board Groundwater Ambient Monitoring and Assessment (GAMA) Program (SWRCB 2019) is the primary source of groundwater quality data in the Basin. The GAMA program has water quality data from 27 wells. Only six of these wells have recent water quality data (data collected since January 2015).

Division of Drinking Water (DDW)

There are four drinking water systems (Corona, EVMWD, Temescal Valley Water District [TVWD], and Glen Ivy Golf Club), with a total of eight well locations in the Basin. These stations report water quality data to the DDW. Each system monitors and reports water quality parameters to DDW and is required to participate in the Drinking Water Source Water Assessment Program (DWSAP) to ensure wells are not subject to local contamination.

Other Agencies

The RWQCB regulates one site in the Basin, Villa Park Trucking. Groundwater quality data were collected from one well on site from 1997 to 2007. In addition, DWR monitored 17 wells in the Basin from 1955 to 1988 and the USGS monitored two wells from 2006 to 2011.

Wells with water quality data from all available sources are shown on **Figure 4-11**.

4.5. OTHER STUDIES

4.5.1. Salt and Nutrient Management Plan 2017

The RWQCB manages salinity in the Santa Ana River Basin, in part by regulating the discharge and reuse of recycled water. TDS and nitrate concentration limitations for recycled water discharge and reuse are set by the RWQCB based on the Wasteload Allocation for surface waters in the Santa Ana River Watershed and the antidegradation objectives and ambient TDS and nitrate concentrations of the receiving groundwater management zone (GMZs), as defined in the Water Quality Control Plan for the Santa Ana River Basin (Basin Plan). While there were two GMZs in the Basin (Bedford and Coldwater), Bedford was combined into the Upper Temescal Valley GMZ.

Consistent with the 2013 SWRCB Recycled Water Policy, a Salt and Nutrient Management Plan (SNMP) was developed for the Upper Temescal Valley, including the Bedford area, in 2017 (WEI 2017a). The purpose of the SNMP was to identify sources of salts and nutrients (current and future) as context for assessing potential impacts of recycled water projects and to plan for management of salt and nutrient sources to ensure that groundwater is safe for drinking and all other beneficial uses. Beneficial uses of water and respective water quality objectives are defined by the RWQCB in the Basin Plan. The report found that TDS concentrations were highly variable across space and time, ranging from a low of 240 milligrams per liter (mg/L) to a high of 1,500 mg/L, and there was no significant long-term trend of water quality degradation or improvement. Similar to TDS, nitrate concentrations are also highly variable; however, there does appear to be a decrease in concentrations over time, which is probably due to the reduction in irrigated agriculture land uses and hence a reduction in added nitrogen in the form of fertilizers.

The SNMP recommended TDS and nitrate antidegradation objectives for the Upper Temescal Valley GMZ consistent with the 2004 Basin Plan. These proposed objectives for TDS and Nitrate as N are 820 mg/L and 7.9 mg/L, respectively (WEI 2017a). These objectives (pertinent to Bedford area) are lower (stricter) than drinking water standards.

4.6. THREATS TO WATER QUALITY

4.6.1. Regulated Facilities

The RWQCB regulates one site in the Basin, Villa Park Trucking. Groundwater quality data were collected from one well on site from 1997 to 2007, and the site has since been closed.

4.6.2. Septic Systems

Some limited areas of the Basin are not served by municipal sewer and rely on on-site wastewater treatment (OWTS or septic systems). These represent sources of salt and nutrient loading to groundwater, as well as potential sources of other contaminants. Riverside County Department of Environmental Health is the permitting agency for septic systems and wells in the County. The Riverside County Department of Environmental Health maintains an inventory of septic system installations but does not track which remain active. While it is known how many of these septic systems exist, the number is assumed minimal; most of the BCGSA area is sewered.

4.6.3. Non-point Sources

Nonpoint source (NPS) pollution is defined by the SWRCB as contamination that *does not originate from regulated point sources and comes from many diffuse sources*. NPS could occur when rainfall carries contaminants to surface water ways or percolates contaminants to groundwater. One example relevant to the Basin is loading to groundwater of nitrate from agricultural or landscaping land applications.

4.7. KEY CONSTITUENTS OF CONCERN

TDS and nitrate are the primary indicators for salt and nutrient loading and thus are key constituents of concern (COCs) for Basin management.

TDS data are available for both inflows and outflows from the Basin. There are elevated natural background TDS concentrations in groundwater. In addition, TDS can be an indicator of anthropogenic impacts (e.g., infiltration of urban runoff, agricultural return flows, and wastewater disposal).

Nitrate is the primary form of nitrogen detected in groundwater and natural nitrate levels in groundwater are generally very low. Elevated concentrations of nitrate in groundwater are associated with agricultural activities, septic systems, landscape fertilization, and wastewater treatment facility discharges. The maximum contaminant level (MCL) for nitrate (as nitrogen) is 10 mg/L. Nitrate data are available for Basin inflows and outflows, and as documented in the SNMP (WEI 2017a), elevated nitrate concentrations have been recognized. The SNMP analysis of nitrate loading found that most areas had predicted small increasing trends in nitrate in groundwater. However, no wells exceed the MCL for nitrate.

4.7.1. Key Constituents in Groundwater

TDS and nitrate are the constituents of concern in the Basin. Current average conditions (2010 through 2019) show average recent concentrations of TDS of 674 mg/L and nitrate as nitrogen concentrations of 2.75 mg/L. The values represent the average concentrations of these constituents in all drinking water and ambient groundwater monitoring events between 2010 and 2019; water quality samples from regulated facilities were not included in the analysis. These average conditions serve as a snapshot and allow a comparison of water quality conditions across the Basin.

4.7.2. Total Dissolved Solids (TDS)

As indicated above, average recent TDS concentrations in the Basin are just below the secondary MCL for drinking water (500 mg/L). Recent maximum TDS concentrations from all wells are shown on **Figure 4-12**. While recent concentrations are generally lower than 500 mg/L several historical water quality analyses from wells had higher concentrations of TDS (e.g., exceeding 500 mg/L). Based on data collected by the BCGSA agencies and Glen Ivy (a small water system) from 2010 through 2019, TDS ranges from 210 milligrams per liter (mg/L) to 1,110 mg/L. The recommended TDS secondary maximum contaminant level (SMCL) for aesthetics is 500 mg/L.

4.7.3. Nitrate as Nitrogen (NO_3 as N)

The average recent nitrate as nitrogen concentration (2.75 mg/L) is low relative to the MCL of 10 mg/L. **Figure 4-13** shows the maximum nitrate as nitrogen concentrations at each well in the Basin. Several wells in the northern portion of the Basin show elevated historical nitrate concentration of up to 24.8 mg/L. However, no current nitrate detections exceed the MCL of 10 mg/L for nitrate as nitrogen. Nitrate has multiple and widespread sources including fertilizer application (agricultural and landscaping) and wastewater disposal (both municipal and domestic). Given that these sources are on or near the ground surface, shallow groundwater typically is characterized by higher concentrations than deep groundwater.

4.7.4. Other Constituents

In 2021, the BCGSA performed a round of baseline water quality sampling for the GSP. This sampling was designed to serve as a snapshot of ambient water quality for 48 constituents, including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Eight wells were sampled, three in Bedford and two in Coldwater; the results of this sampling event are included in **Appendix F**. PFOS and PFOA were detectable with maximum concentration of 14 nanograms per liter (ng/L) and 25 ng/L respectively. The PFOS concentration is slightly above the response limit of 10 ng/L parts per trillion (ppt) but the PFOA concentration is below the 40 ng/L for PFOS (SWRCB 2020). The response limit for both PFOS and PFOA are based on a running four quarter average, so are not triggered by one sample.

Available water quality data indicate slightly elevated sulfate concentrations in the Basin. While historical sulfate concentrations ranged from 4 to 339 mg/L, recent samples collected in 2021 show sulfate concentrations from 110 to 270 mg/L. Concentrations in two Bedford wells were above the SMCL for sulfate of 250 mg/L but all wells were below the primary (health related) MCL of 500 mg/L. Sulfate will continue to be monitored as part of the BCGSA's monitoring program, it was not selected as a constituent of concern. The causes of elevated sulfate may be anthropogenic or naturally occurring. The anthropogenic sources of sulfate are likely from historical agricultural practices that are similar to nitrate and the natural occurrence due to geologic environment are similar to TDS. Therefore, TDS and nitrate are sufficient proxies for sulfate.

Other constituents that could impact beneficial uses or users, including arsenic, were not detected. While recent water quality data are limited, there is no indication of other constituents of concern. The BCGSA will continue to monitor water supply wells for Title 22 constituents to ensure adequate water quality in the Basin.

4.7.5. Vertical Variations in Water Quality

Water quality monitoring programs in the Basin do not show a distinct difference of water quality in depth, in part because most of the ambient monitoring wells have long screened intervals or are collected from wells with unknown construction.

4.8. SEAWATER INTRUSION CONDITIONS

The Basin is located approximately 25 miles inland from the Pacific Ocean. Lowest elevations (at the northern boundary of the Basin) are above about 1,000 feet. No risk of seawater intrusion exists in the Basin given its location.

4.9. INTERCONNECTION OF SURFACE WATER AND GROUNDWATER

Interconnection of groundwater and surface water occurs wherever the water table intersects the land surface and groundwater discharges into a stream channel or spring. These stream reaches gain flow from groundwater and are classified as gaining reaches. Conversely, connection can occur along stream reaches where water percolates from the stream into the groundwater system (losing reaches), provided that the regional water table is close enough to the stream bed elevation that the subsurface materials are fully saturated along the flow path.

Groundwater pumping near interconnected surface waterways or springs can decrease surface flow by increasing the rate of percolation from the stream or intercepting groundwater that would have discharged to the stream or spring. If a gaining stream is the natural discharge point for a groundwater basin, pumping anywhere in the basin can potentially decrease the outflow, particularly over long time periods such as multi-year droughts.

Because of the long dry season that characterizes the Mediterranean climate in Riverside County, vegetation exploits any near-surface water sources, including the water table along perennial stream channels, the wet soil areas around springs, and areas where the water table is within the rooting depth of the plants. Plants that draw water directly from the water table are called phreatophytes. They are able to continue growing vigorously during the dry season and typically stand out in summer and fall aerial photographs as patches of vegetation that are denser, taller, and brighter green than the adjacent vegetation.

4.9.1. Stream Flow Measurements

Three USGS streamflow gaging stations provide a general characterization of the stream flow regime in Temescal Wash and its tributaries. Their locations are shown in **Figure 4-14**, and daily flows during water years 2013 through 2020 are shown in **Figure 4-15**. Temescal Creek at Corona Lake (USGS 11071900) is located at the outlet of Lee Lake at the upstream end of the Basin. Flow at that location is primarily ephemeral, occurring only during and immediately following rainstorm events. No flow was recorded for three consecutive years during the recent drought. However, the gage also records recycled water discharges from Eastern Municipal Water District (EMWD), which historically have often been large enough to flow down Temescal Wash as far as Lee Lake. Those discharges were more common prior to the period of gaged flows but still occur in wet years when EMWD is unable to use or store all of its recycled water.

The gauge on Coldwater Canyon Creek has only been in operation for one year, and it is the only record of flow in any drainage on the eastern slopes of the Santa Ana Mountains. The flow regime includes high peaks during storm events and small but persistent base flow supported by drainage of groundwater from fractured bedrock in the watershed. These small flows rapidly percolate where the creek enters the Basin and do not reach Temescal Wash. All of the tributary watersheds on the west side of the Basin likely have similar flow regimes. The gauge above Main Street in Corona experiences many more peak flow events. Most of these additional flow events probably derive from impervious runoff in the surrounding urban area. A steady base flow of about 2 cubic feet per second (cfs) is not groundwater discharge, but so-called nuisance water (for example, sprinkler overspray onto paving, or pipe leaks) plus discharge from the wastewater treatment plant upstream of the gauge.

A review of 27 high-resolution aerial photographs (Google Earth 2021) between 1994 and 2020 did not reveal any reaches of Temescal wash that appeared to have groundwater discharge; that is, flowing or ponded reaches in an otherwise dry channel during the dry season. Thus, the reach of Temescal Wash that passes through the Bedford-Coldwater Basin does not appear to gain flow from groundwater seepage into the channel, at least during the dry season. Water levels in wells near the creek further suggest that the water table is usually below the creek bed elevation. Data showing depth to the water table are discussed in the next section.

4.9.2. Depth to Groundwater

Depth to groundwater provides a general indication of locations where gaining streams and riparian vegetation are likely to be present. However, available data are of limited use for this purpose due to insufficient geographic and vertical coverage. Available data are almost entirely from water supply wells, which are typically screened deep in the aquifer. The groundwater elevation (potentiometric head) at the depth of the well screen can be different from the true water table, which is the first zone of saturation reached when drilling down from the ground surface. Because recharge occurs at the land surface and pumping occurs at depth, deep alluvial basins such as this one typically have large downward head gradients within the aquifer system. Thus, water level information from wells can potentially underestimate the locations where the water table is shallow enough to support phreatophytic riparian vegetation.

Creeks and rivers that lose water commonly form a mound in the water table near the creek or river. The height and width of the mound depends on the transmissivity of the shallowest aquifer. As an example, in other basins where this condition is observed, groundwater elevations in a shallow well adjacent to the Arroyo Seco in the Salinas Valley California rose 5 to 10 feet more than groundwater elevations in wells 1,000 feet away when the river started flowing (Feeney 1994). A groundwater ridge up to 12 feet high develops beneath Putah Creek in Yolo County California during the flow season, but the width of this ridge was estimated to be only a few hundred feet (Thomasson et al. 1960). These examples suggest that shallow wells within 100 to 200 feet of a stream channel would be needed to confirm the presence of hydraulic connection between surface water and groundwater in the Bedford-Coldwater Basin.

Groundwater does not discharge into streams unless the water table is equal to or higher than the elevation of the stream bed. In addition, the water table does not provide water to phreatophytic vegetation unless it is at least as high as the base of the root zone. The depth of the root zone is uncertain, partly because the relatively few studies of rooting depth have produced inconsistent results and partly because rooting depth for some riparian species is facultative. This means that the plants will grow deeper roots if the water table declines. Many species (including cottonwood and willow) germinate on moist soils along the edge of a creek in spring. As the stream surface recedes during the first summer, the seedlings survive if the roots grow at the same rate as the water-level decline. Over a period of years, roots grow deeper as the land surface accretes from sediment deposition and/or the creek channel meanders away from the young tree or shrub.

Available water level data from wells were reviewed to identify parts of the Basin where the water table elevation might possibly be high enough to be reached by phreatophyte roots. For screening purposes, a depth to water of less than 30 feet in wells was selected as a threshold for identifying possible phreatophyte areas. This depth allows for 10 to 15 feet of root depth, 5 feet of elevation difference between the water level in the well and the overlying true water table, and 15 feet of elevation difference between well heads and the bottoms of nearby creek channels.

A second limitation of available groundwater elevation data is the sparse geographic distribution of wells with measurements. Fortunately, many wells in the Basin with water-level data are located along Temescal Wash. **Figure 4-16** shows a map of the eleven wells with relatively long-term water-level records. They are clustered into five areas. The only location where the typical spring depth to water was less than 30 feet was at the north end of the Basin, near the Flagler and Corona Non-Potable wells. Hydrographs of water levels in those wells are shown in **Figure 4-17**. Typical spring depths to water in the five wells in that area ranged from 15 to 27 feet. Slightly farther upstream—at the TVWD wells—typical depths to water were slightly greater than 30 feet. Depth to water increases rapidly to the west of Temescal Wash. At the Corona and Station 71 wells, the typical depth to water was 80 to 200 feet.

In summary, groundwater levels in the Basin appear to be too low to normally maintain a hydraulic connection with the Temescal Wash channel. Therefore, groundwater pumping does not deplete flow in Temescal Wash. Groundwater levels might be high enough to support phreatophytic riparian vegetation with roots extending 10-15 feet below the elevation of the creek bed.

4.9.3. Riparian Vegetation

Vegetation data provide mixed evidence that the water table near some reaches of Temescal Wash is shallow enough to supply water to phreatophytes. Where tree and shrub roots are able to reach the water table, riparian vegetation is typically denser and greener than along reaches where vegetation is supplied only by residual soil moisture from the preceding wet season. Patches of dense riparian vegetation visible in multiple Google Earth (2021) aerial photographs from 1994-2014 are indicated by a crosshatch pattern in **Figure 4-16**. However, older and more recent aerial photographs indicate that the vegetation has not been a permanent feature of the landscape. The figure also shows the distribution of vegetation classified as Natural Communities Commonly Associated with Groundwater (NCCAG) by The Nature Conservancy in cooperation with DWR. Based on multiple historical vegetation surveys from the early 2000s, the Nature Conservancy prepared detailed statewide mapping of NCCAG vegetation that is accessible on-line (DWR et al. 2020). The extent of NCCAG vegetation is much greater than the extent of dense riparian vegetation and includes vegetation where the water table is certainly deeper than the root zone (such as near the Corona wells). Thus, some of the vegetation in the NCCAG polygons is probably not relying on groundwater. Furthermore, some of the plant species included in the NCCAG mapping are facultative phreatophytes, which means they will exploit a water table if it is within a reachable depth but otherwise survive on soil moisture (typically with smaller stature and greater spacing between plants). These species include red willow (*Salix* laevigata), which is the most common species mapped along Temescal Wash.

An additional test for groundwater dependence of riparian vegetation was to compare changes in groundwater elevation with changes in vegetation health during the 2012 to 2015 drought. Vegetation health can be detected by changes in the way the plant canopy absorbs and reflects light. The spectral characteristics of satellite imagery can be processed to obtain two metrics commonly used to characterize vegetation health: the Normalized Difference Vegetation Index (NDVI) and the Normalized Difference Moisture Index (NDMI). Both are calculated as ratios of selected visible and infrared light wavelengths. The Nature Conservancy developed a second on-line mapping tool called GDE Pulse that provides annual dry-season averages of NDVI and NDMI for each mapped NCCAG polygon for 1985-2018 to assist with the identification of groundwater dependent ecosystems (GDEs) (TNC 2020). In **Figure 4-16**, the polygons are color-coded by the change in NDMI from 2012 to 2015, with positive values in increasingly dark shades of green and negative values in increasingly dark shades of red. Negative values indicate stress due to desiccation. The NDVI patterns were similar to the NDMI patterns.

Inconsistencies are immediately apparent. One would expect all of the polygons to have experienced moisture stress during the drought, but about one-third of them experienced little stress. In some cases, an unstressed polygon adjoins a highly stressed polygon, which would be unlikely if declining groundwater levels were the cause of the stress. In spite of these inconsistencies, the dominant pattern was a decrease in NDMI. This was notably the case for the red willow patch that occupies roughly the northern third of the Temescal Wash reach in the Basin.

Further evidence of drought stress can be seen directly in aerial photographs. **Figure 4-18** shows Google Earth (2021) photos of a reach adjacent to the golf course located about 1,000 feet upstream of the Corona Non-Potable wells. Photographs of the same location in 2012, 2014 and 2016 are shown. There was little apparent change from 2012 to 2014, but by 2016 many of the trees along the central channel appeared to be dead.

Water levels in wells with relatively shallow depth to water declined 15 to 25 feet during 2012 to 2015, albeit unevenly in some wells. Thus, the declining NDMI values and substantial vegetation mortality both occurred during the same period that groundwater levels declined. Notably, most of the water-level decline was between 2014 and 2016, which was the period when most of the vegetation mortality occurred. The correlation between groundwater levels and vegetation health does not necessarily prove causality, because other sources of water also became more scarce, including rainfall, irrigation return flow and wastewater discharges to Temescal Wash upstream of the site in the photograph. Rainfall at Elsinore during water years 2013 through 2016 averaged 5.96 inches, or 56 percent of the long-term average. The greater abundance of brown areas on the golf course fairways in 2016 relative to 2014 and 2012 suggest that irrigation had been curtailed due to the drought. The TVWD wastewater treatment plant located two miles upstream of the photo site, at the upstream end of the patch of dense riparian vegetation, normally discharges about 15 acre-feet per month (equivalent to 0.25 cfs) of treated wastewater to Temescal Wash, as shown in **Figure 4-19**. Those discharges were discontinued from November 2012 through at least November 2018 except for one three-month period in winter 2015. The normal discharge could supply roughly one-third of the summer evapotranspiration (ET) demand of the entire reach of vegetation between the discharge point and the end of the Basin.

Older historical aerial photographs show that dense riparian vegetation was not always present prior to the 1990s (that is, prior to the Google Earth imagery). **Figure 4-20** shows aerial photographs taken in 1967 of a 2-mile reach of Temescal Wash in the northern part of the Bedford-Coldwater Basin. It includes the area shown in **Figure 4-18** (green rectangle). There was almost no dense riparian vegetation anywhere along the Wash in 1967. Two factors probably contributed to the lack of vegetation. First, precipitation had been consistently below average since 1947 (see additional discussion in **Chapter 5**). Second, groundwater pumping was higher in those days to support irrigation of citrus groves (some of which are visible in the photograph). Pumping from the Bedford area averaged 3,000 acre-feet per year (AFY) during 1947 to 1967 (WEI 2015b) versus 1,800 AFY during 2015 to 2019. Both of these factors probably contributed to low surface flow and low groundwater levels, which together killed any prior dense riparian vegetation or prevented such vegetation from becoming established.

In summary, the extent, density and health of riparian vegetation has been variable historically. Vegetation appears to become denser and lusher when surface flow is more abundant and groundwater levels are consistently shallow, and it dies back during droughts and when groundwater levels are low. At any given time, the extent to which riparian vegetation along some reaches of Temescal Wash is phreatophytic and therefore affected by groundwater levels is unclear. The presence of groundwater elevations that are probably within reach of phreatophyte roots, the presence of patches of dense riparian tree canopy, and the co-occurrence of groundwater declines and vegetation stress and mortality within the past decade all suggest that some vegetation is dependent on groundwater. However, other drought-related decreases in water availability could have contributed to the observed impacts on vegetation. Additional information regarding the true water table depth in the riparian zone and a more comprehensive evaluation of rainfall, irrigation, and wastewater discharge time series is needed to confirm the degree of vegetation dependence on groundwater levels.

4.9.4. Wetlands

The NCCAG vegetation mapping tool also includes a wetlands map, which is reproduced here with simplified mapping categories in **Figure 4-21**. In the Bedford-Coldwater Basin, almost all of the wetland polygons are within the Temescal Wash channel and accounted for in the preceding discussion of riparian vegetation. The wetland categories for those polygons are mostly marsh (palustrine) or riverine and characterized as seasonally flooded. Vegetation along the low-flow channel is classified as permanently or semi-permanently flooded, which a brief inspection of aerial photographs shows is clearly incorrect. A handful of small wetland polygons were mapped in upland areas west of Temescal Wash. Most are high up in the stream canyons where perennial stream flow or shallow groundwater is sustained by small amounts of groundwater inflow from the bedrock tributary areas and not affected by pumping in the main part of the Basin. Several patches totaling 1.4 acres are midway between the wash and western Basin boundary, where regional groundwater levels are many tens of feet below the ground surface. The seasonal flooding or saturation that supports the wetland-type vegetation almost certainly derives from pooled rainfall runoff or interflow rather than discharge of regional groundwater.

The Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) was reviewed for additional information regarding plant species that might be affected by groundwater (Western Riverside County Regional Conservation Authority 2020). Two large regions mapped as *narrow endemic plants* and *criteria area species* partially overlap the Basin. However, those categories together contain 16 upland plant species that are unaffected by groundwater.

Therefore, the few small areas mapped as wetlands outside the Temescal Wash channel would not be affected by pumping and groundwater levels.

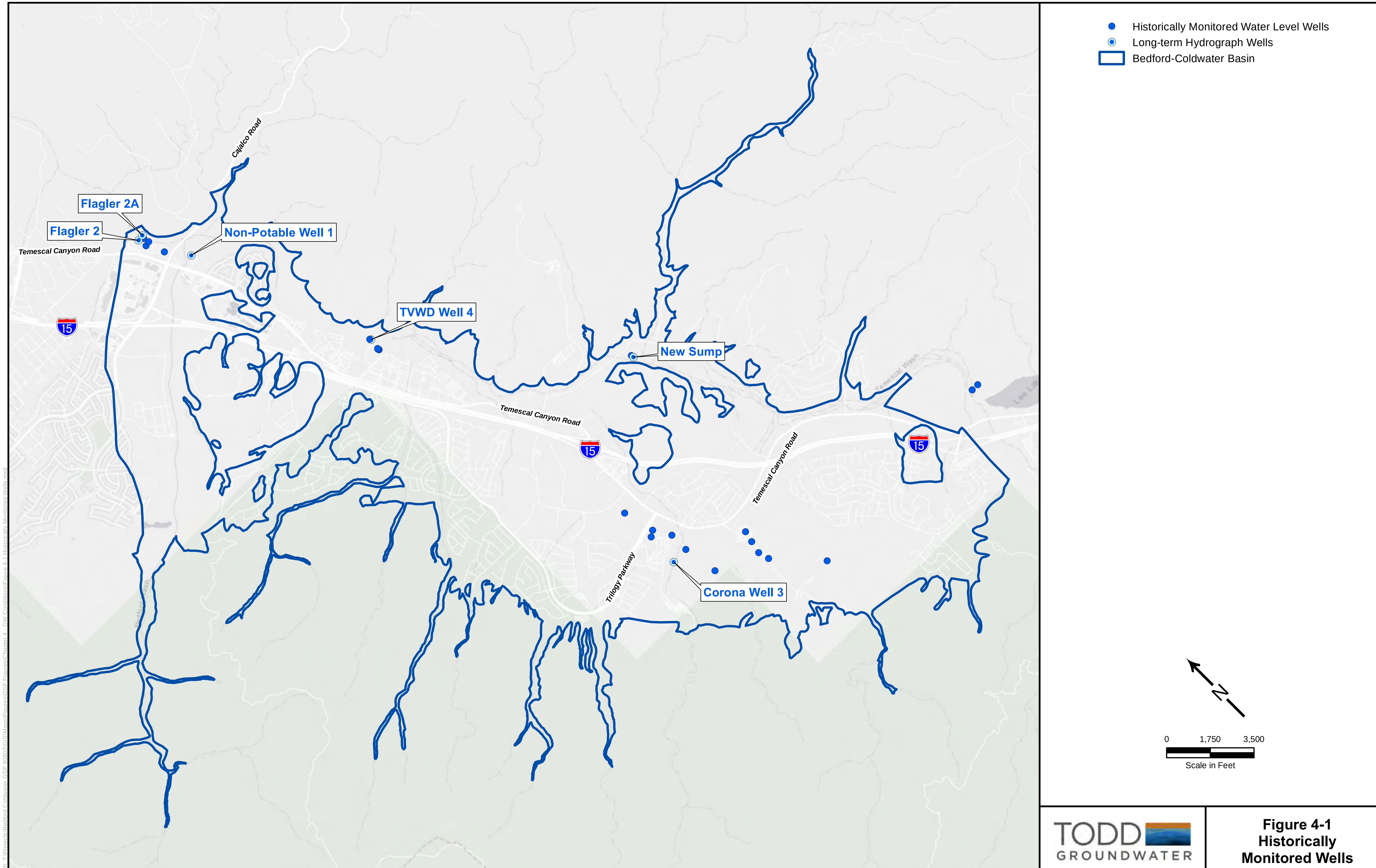
4.9.4.1. Animals Dependent on Groundwater

Animals that depend on groundwater include fish and other aquatic organisms that rely on groundwater-supported stream flow and amphibious or terrestrial animals that lay their eggs in water. Management of habitat for animals typically focuses on species that are listed as threatened or endangered under the state or federal Endangered Species Acts. That convention is followed here. Flow in Temescal Wash is too ephemeral to support migration of anadromous fish (such as steelhead trout), and the watershed upstream of the Basin does not have stream reaches with perennial cool water suitable for spawning and rearing.

The MSHCP includes mapped areas that are potential habitat for several animal species. The western edge of a very large habitat area for burrowing owl overlaps the eastern edge of the Basin. However, the owl is an upland species that is not dependent on riparian or wetland vegetation.

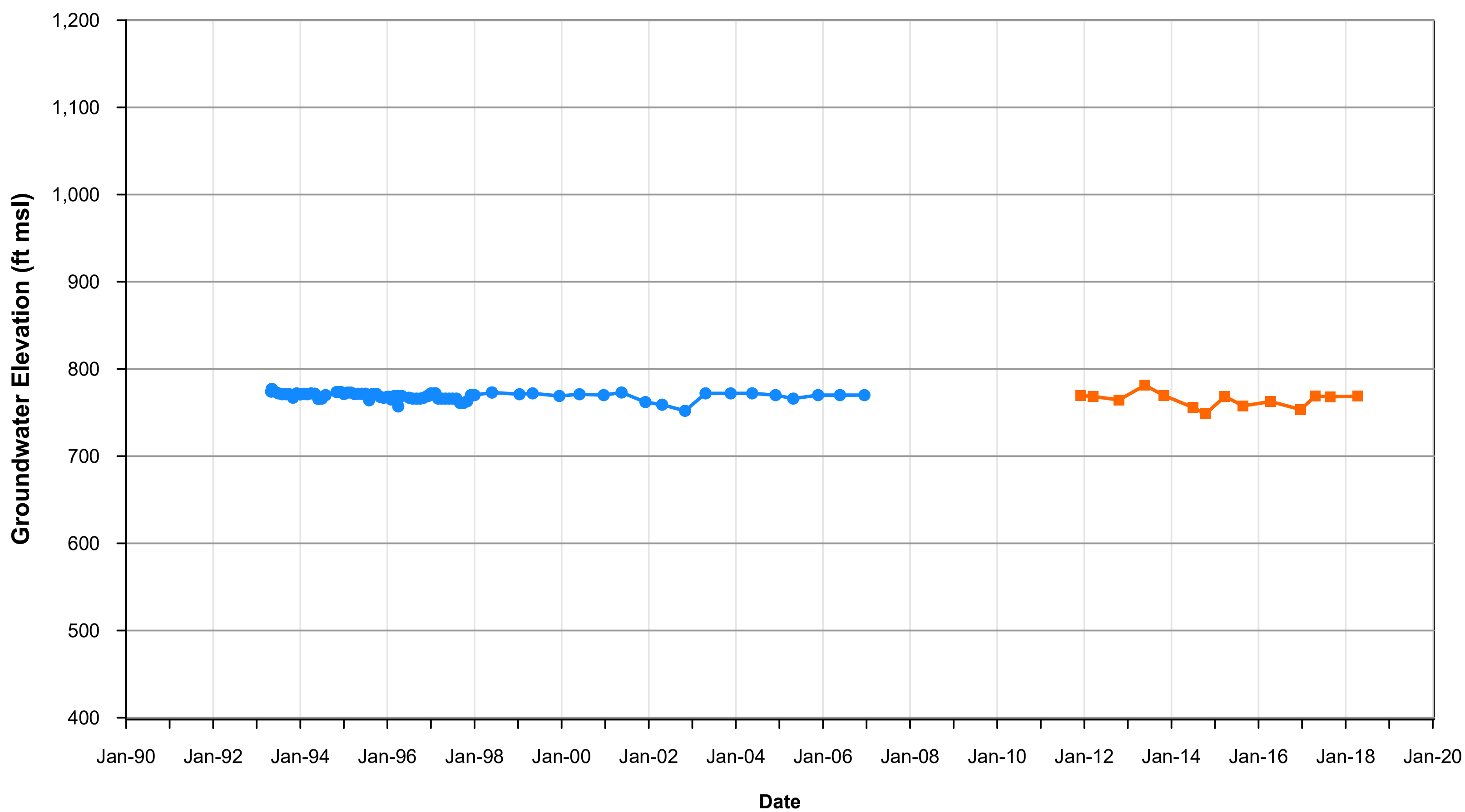
The coastal California gnatcatcher is a bird species federally listed as threatened. Critical habitat areas delineated by the U.S. Fish and Wildlife Service that are in or near the Basin are shown in **Figure 4-22**. The habitat polygons are all in upland areas, but a few of them overlap tributary streams underlain by narrow, shallow alluvial bodies that extend outward from the main Basin area. Groundwater in those tributary creek valleys is sustained by gradual discharge from fractured bedrock in the watershed areas, and there is little or no local groundwater pumping. To the extent that vegetation along the tributary stream valleys provides gnatcatcher habitat, it would be unaffected by pumping in the main Basin area.

In summary, there do not appear to be any listed animal species that would potentially be impacted by groundwater pumping or water levels. More common species that use riparian shrubs and trees along Temescal Wash could potentially be impacted during droughts if lowered groundwater levels cause vegetation die-back or mortality.



TODD GROUNDWATER

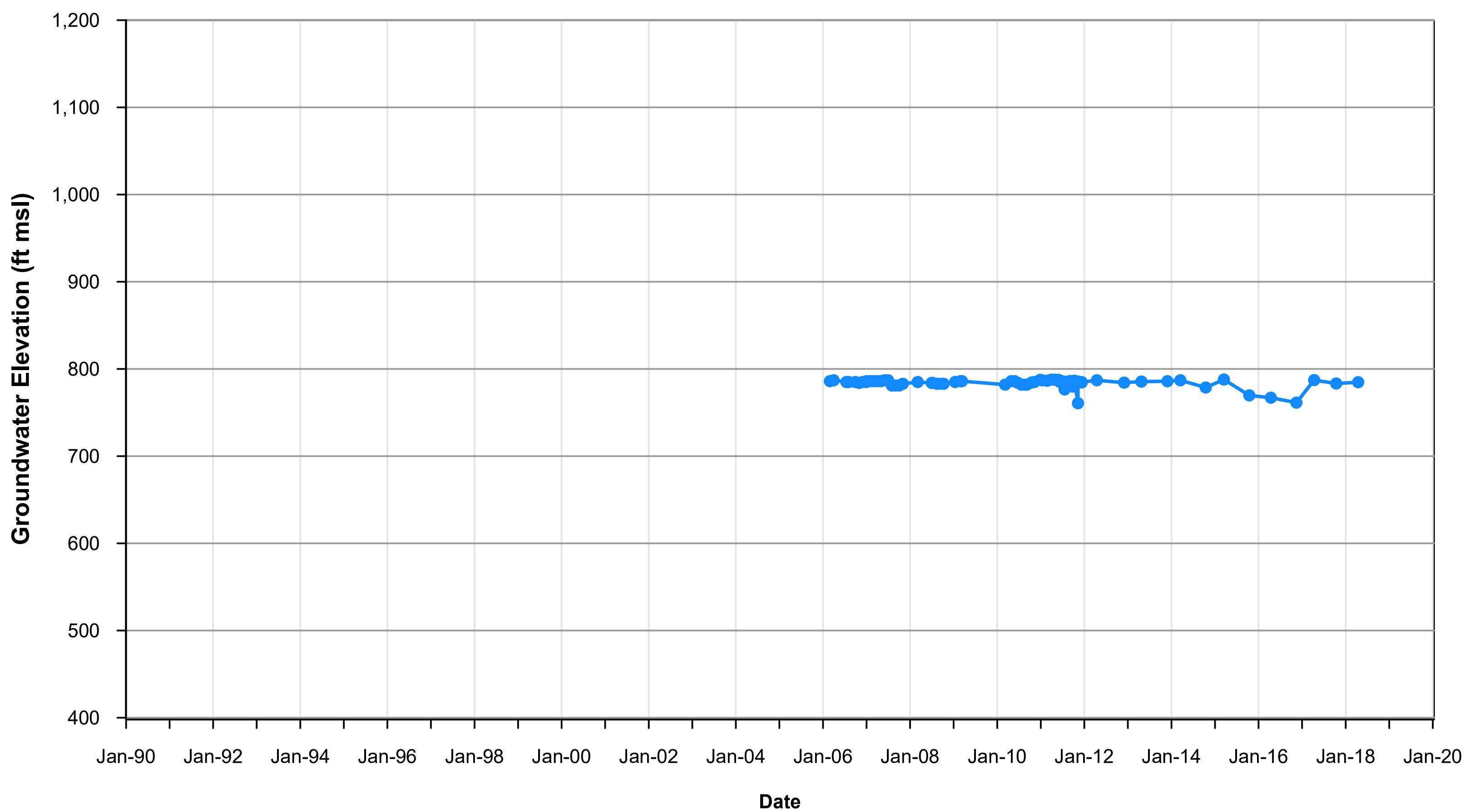
Figure 4-1
Historically Monitored Wells



Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-2 Flagler 2_2A Hydrographs.gpj

TODD GROUNDWATER

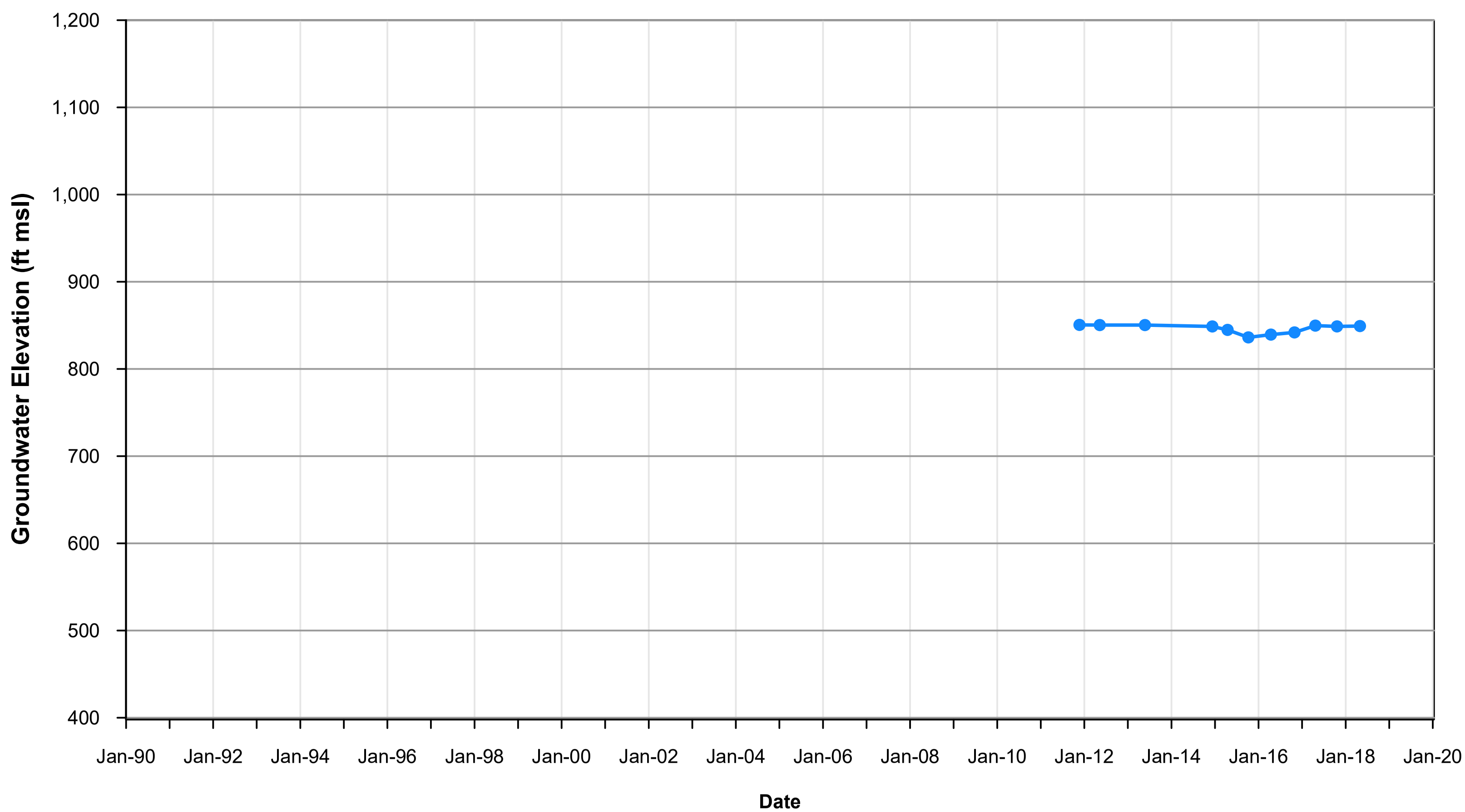
Figure 4-2
Representative Hydrographs
Flagler Wells 2 and 2A



TODD GROUNDWATER

Figure 4-3
Representative Hydrograph
Non-Potable Well 1

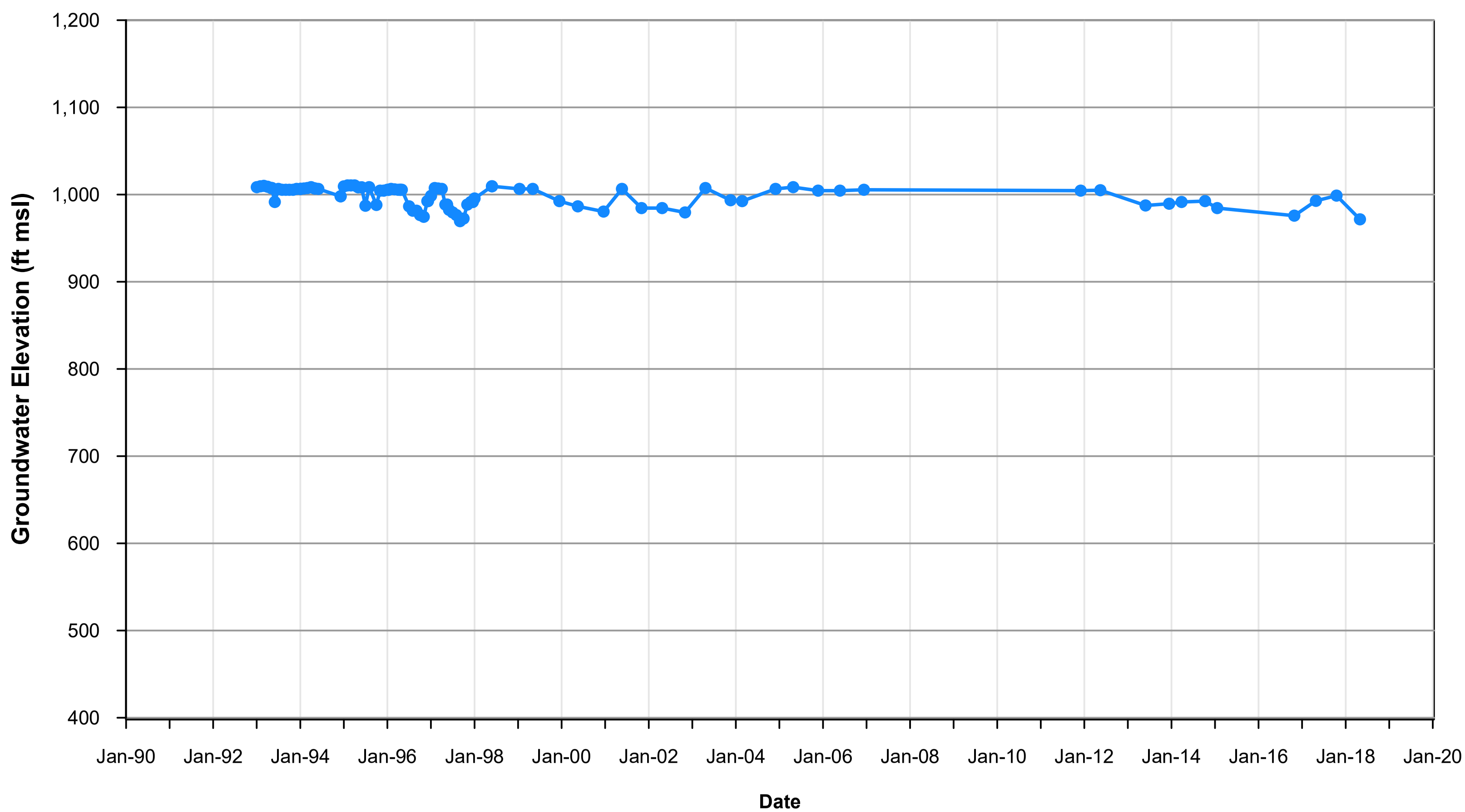
Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-3 Non-Potable Well 1 Hydrograph.gpj



TODD GROUNDWATER

Figure 4-4
Representative Hydrograph
TVWD Well 4

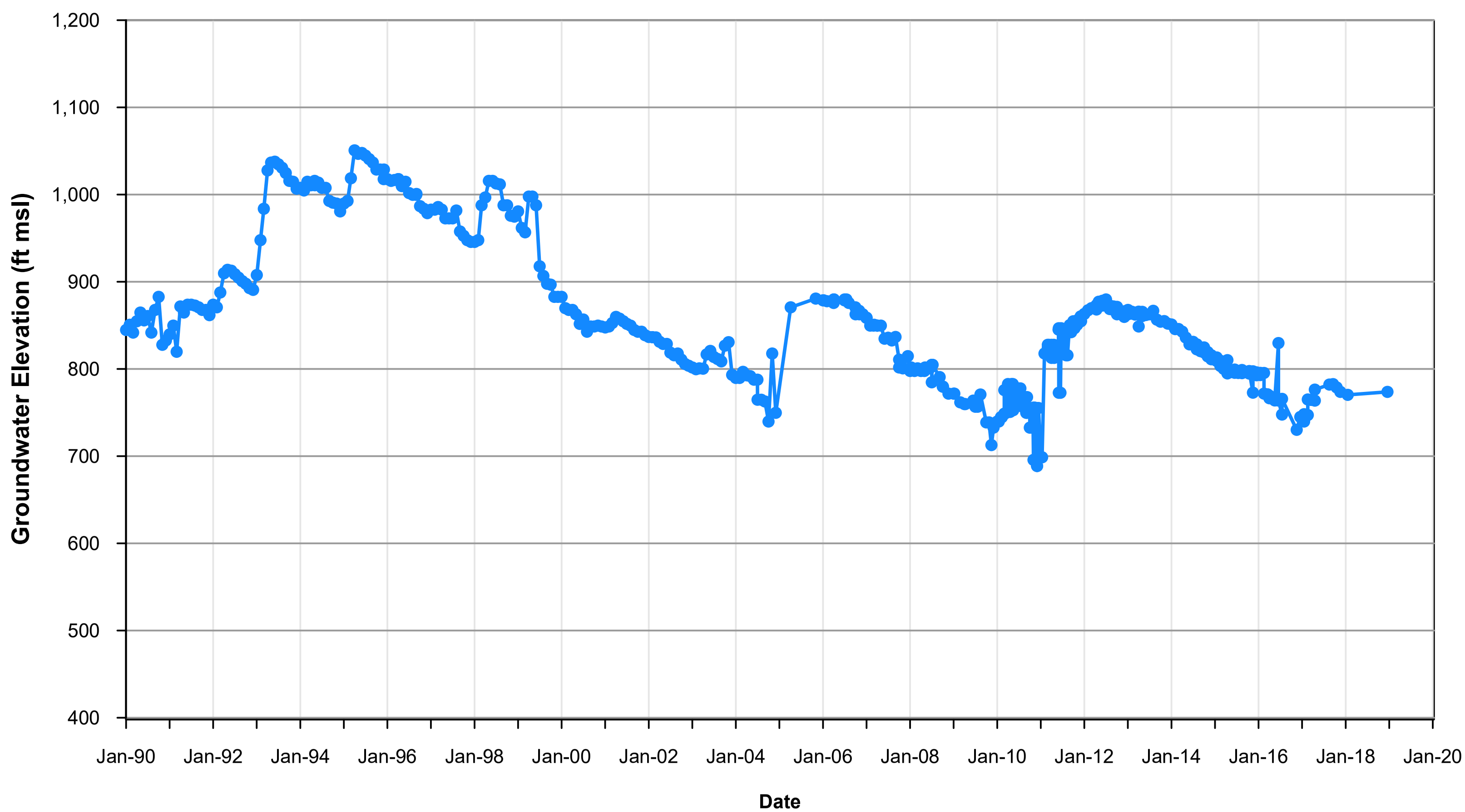
Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-4 TVWD Well 4 Hydrograph.grf



TODD GROUNDWATER

Figure 4-5
Representative Hydrograph
New Sump

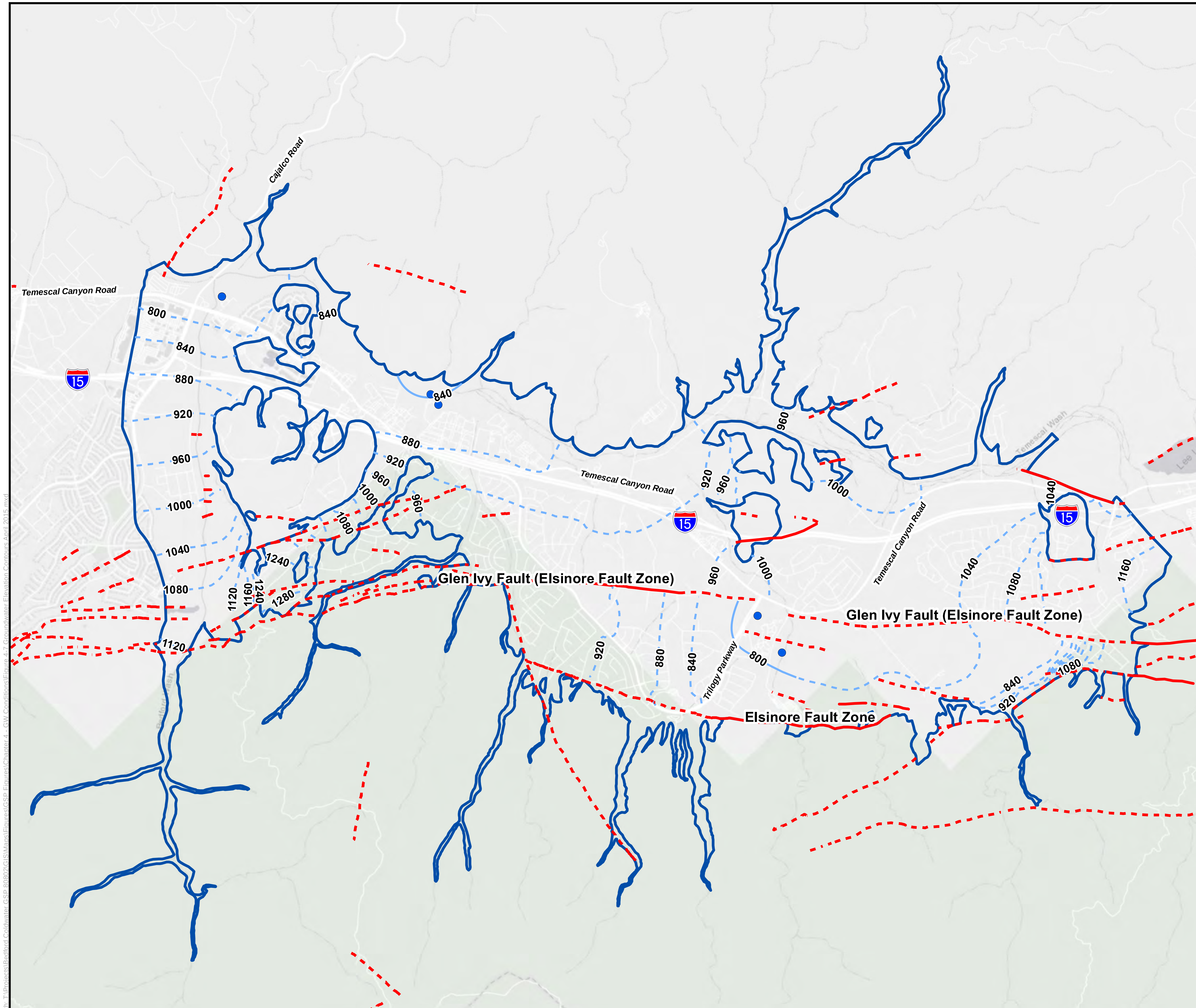
Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-5 New Sump Hydrograph.gpj



TODD GROUNDWATER

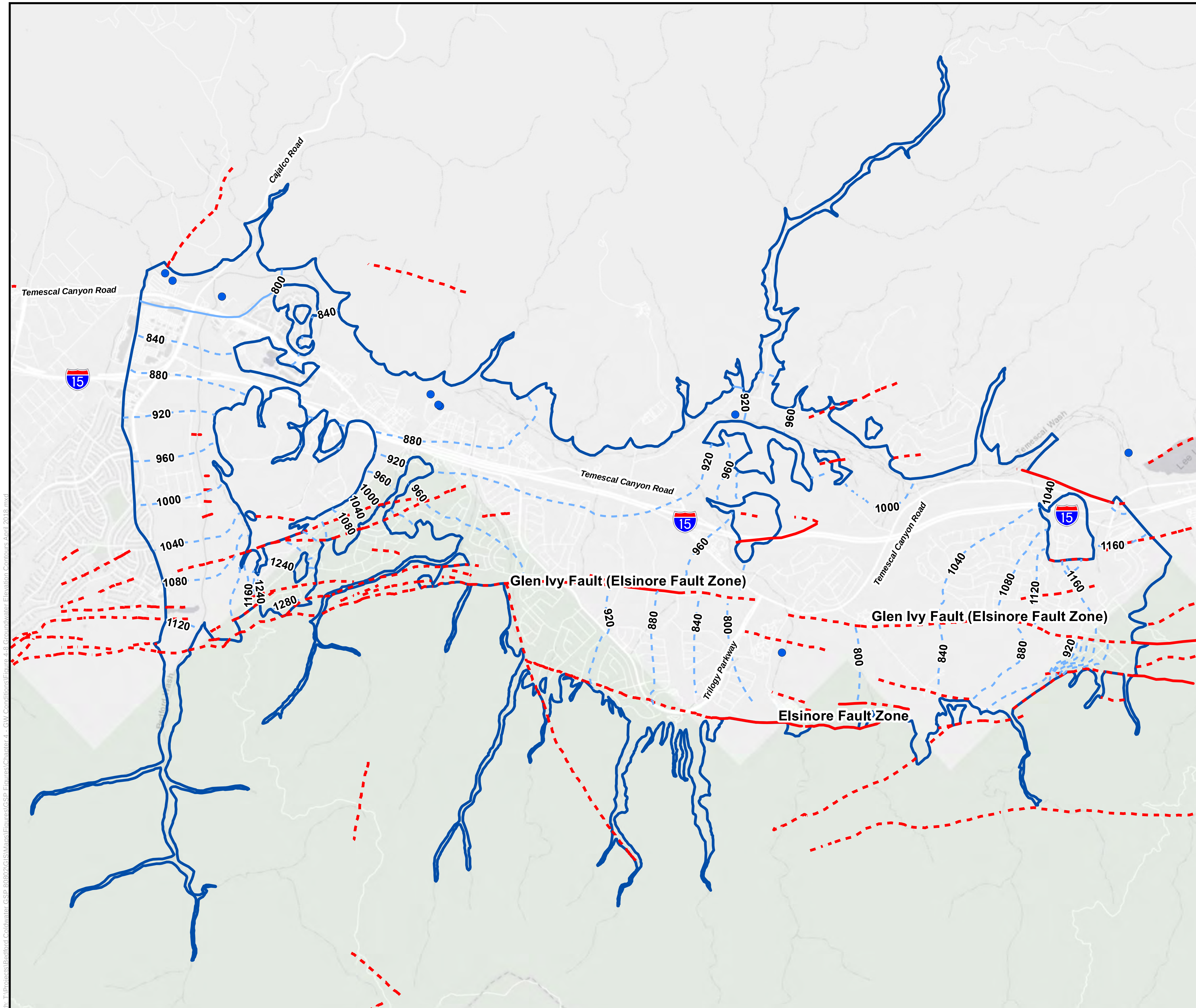
Figure 4-6 Representative Hydrograph Corona Well 3

Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-6 Corona Well 3 Hydrograph.gpj



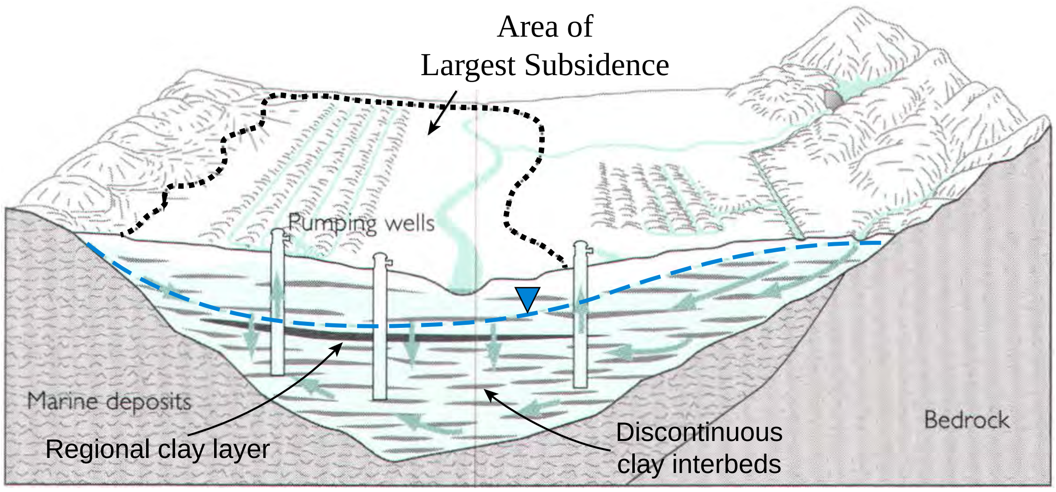
TODD GROUNDWATER

Figure 4-7
Groundwater Elevation Contours
Fall 2015

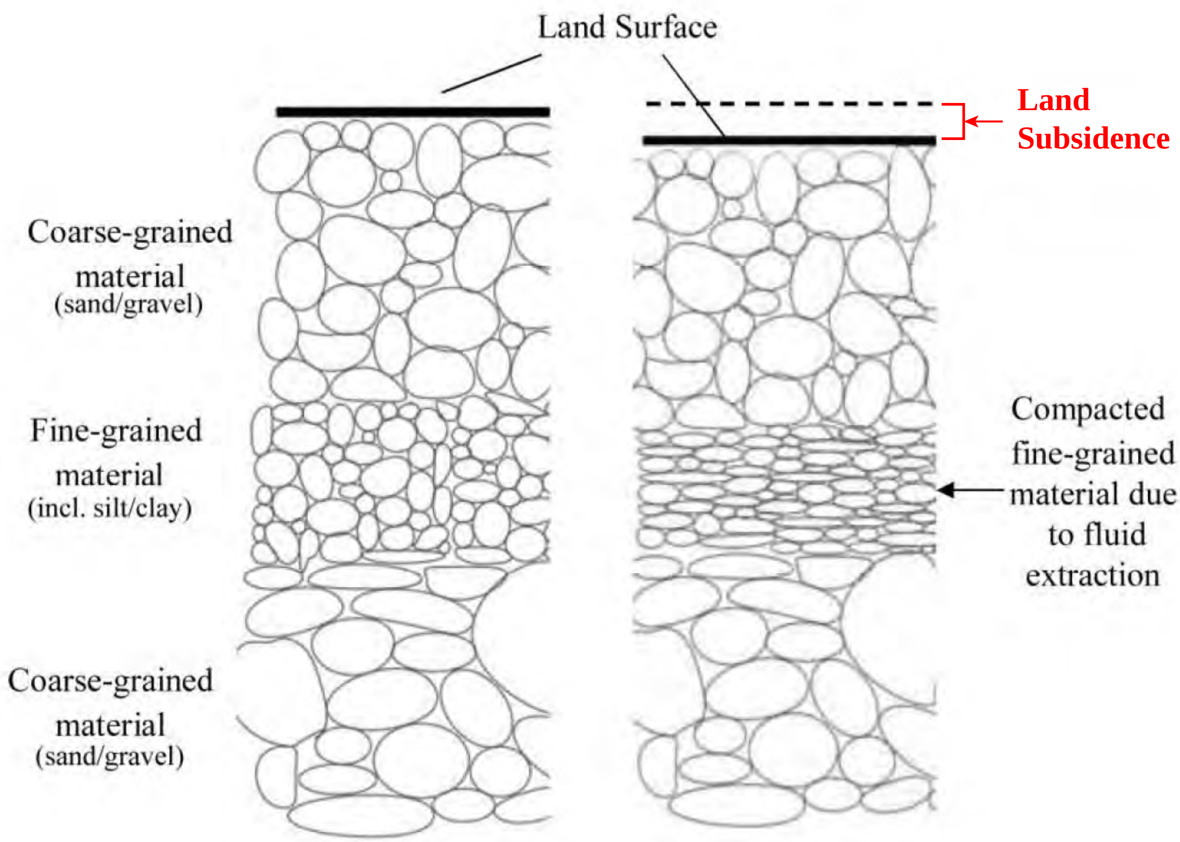


TODD GROUNDWATER

Figure 4-8
Groundwater Elevation Contours
Spring 2018



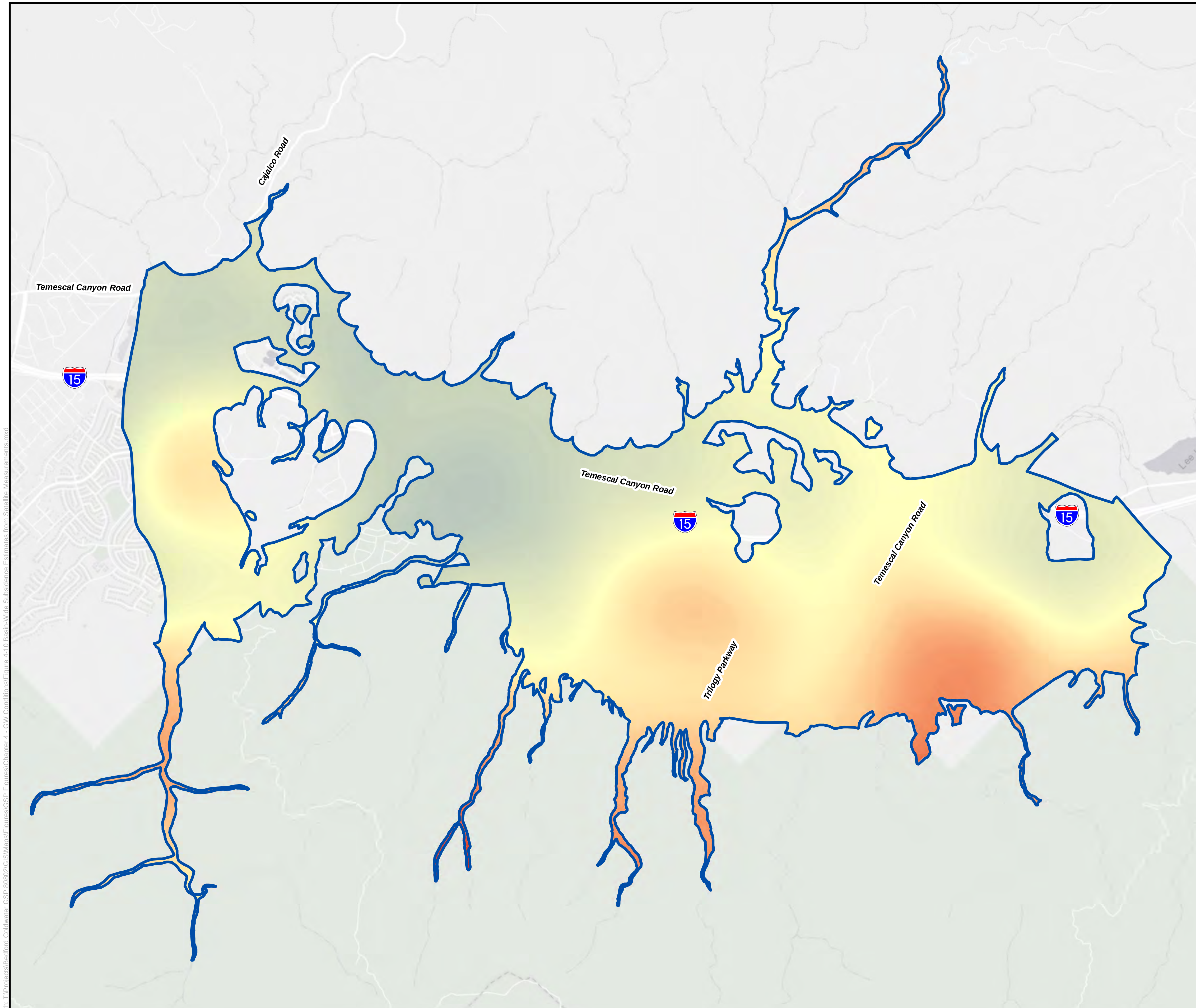
Source: Galloway et al., 1999.



After LSCE et al., 2014.

TODD GROUNDWATER

Figure 4-9
Concepts of
Land Subsidence



Bedford-Coldwater Basin

Subsidence Estimates from Satellite Measurements

High : 0.05 feet

Low : -0.05 feet

N

0 1,750 3,500

Scale in Feet

Data Source:
Subsidence estimates from satellite measurements provided by the TRE ALTAMIRA InSAR provided by the California Department of Water Resources.

TODD GROUNDWATER

Figure 4-10
Basin-Wide Subsidence Estimates from Satellite Measurements

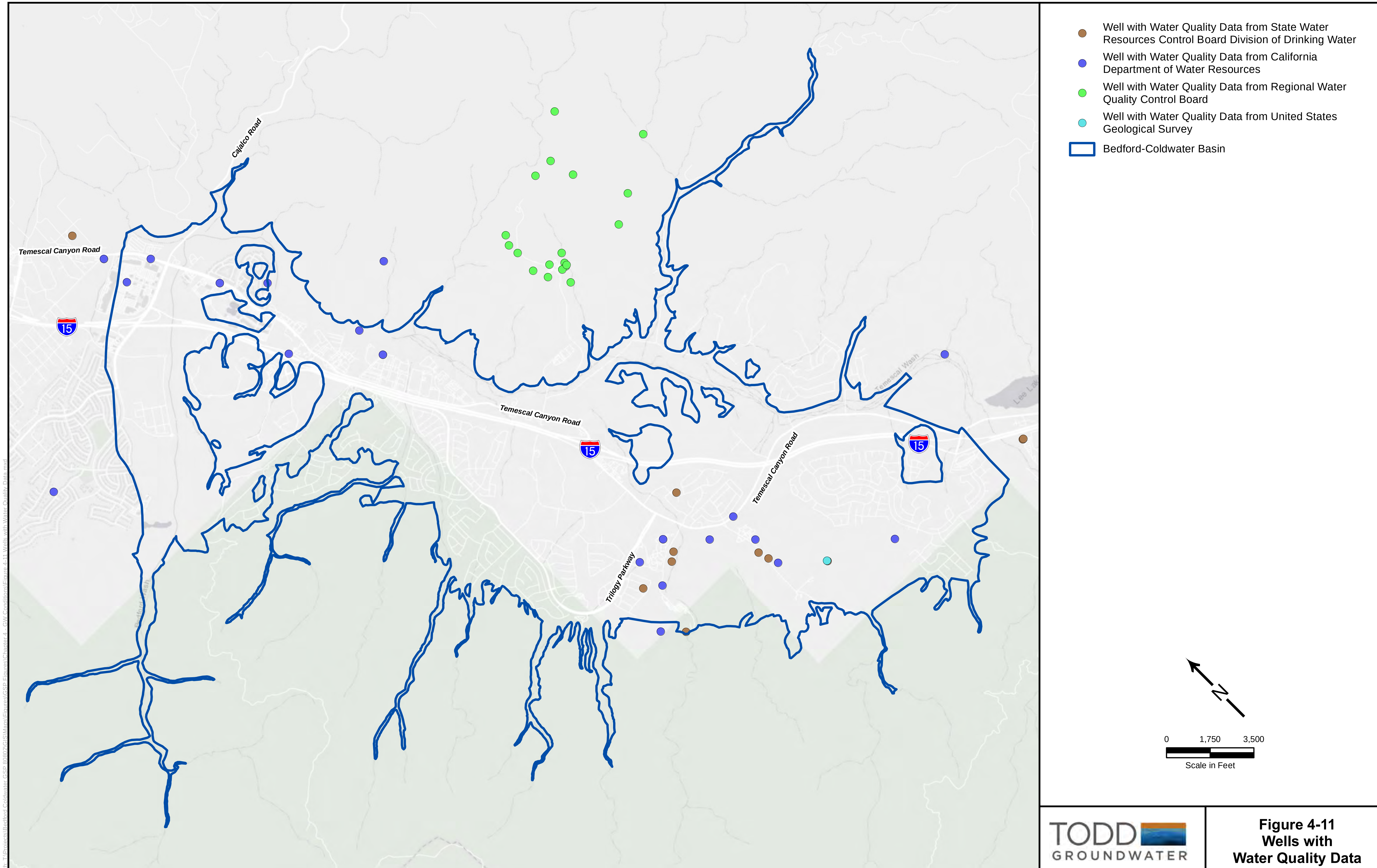


Figure 4-11
Wells with
Water Quality Data

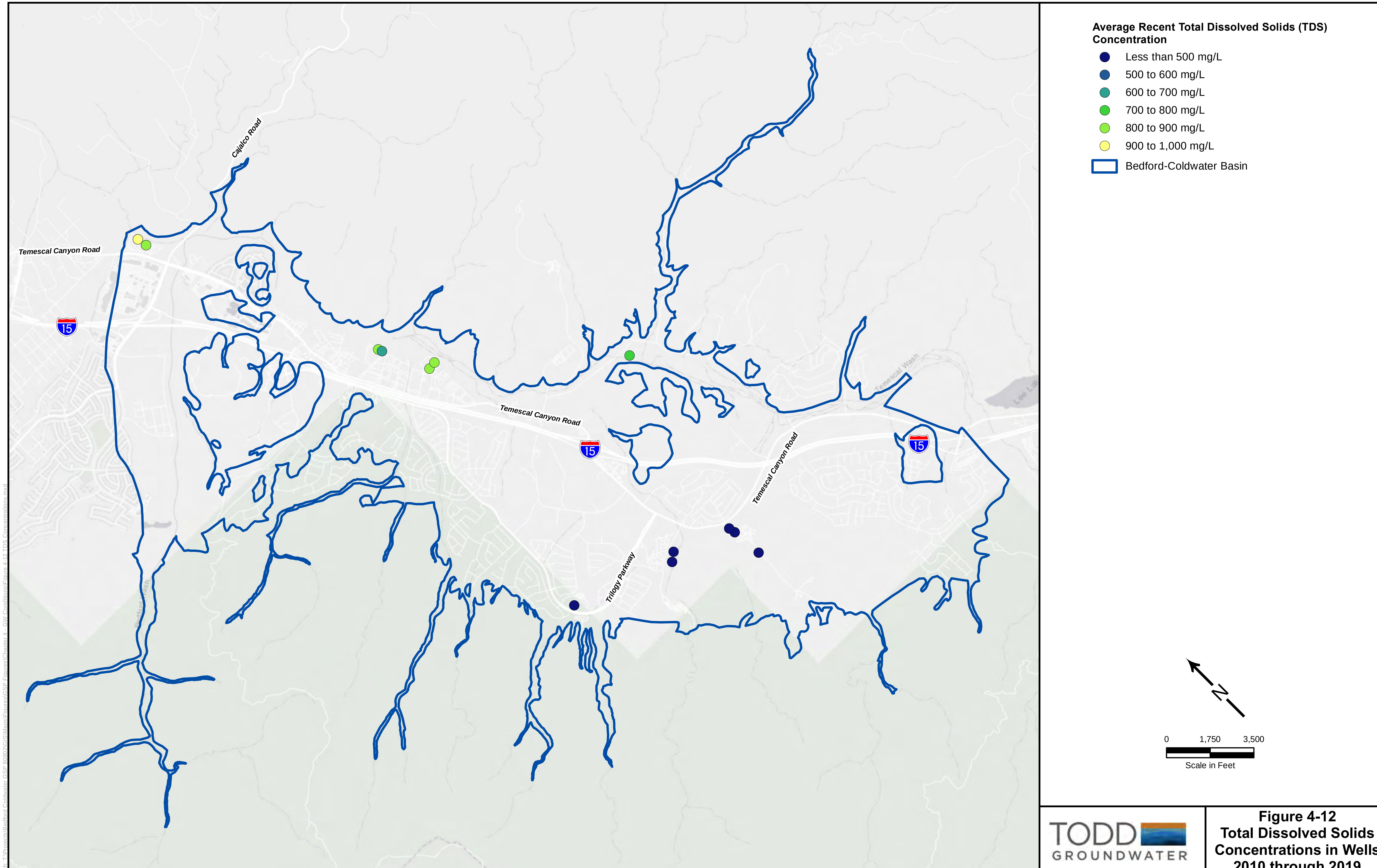
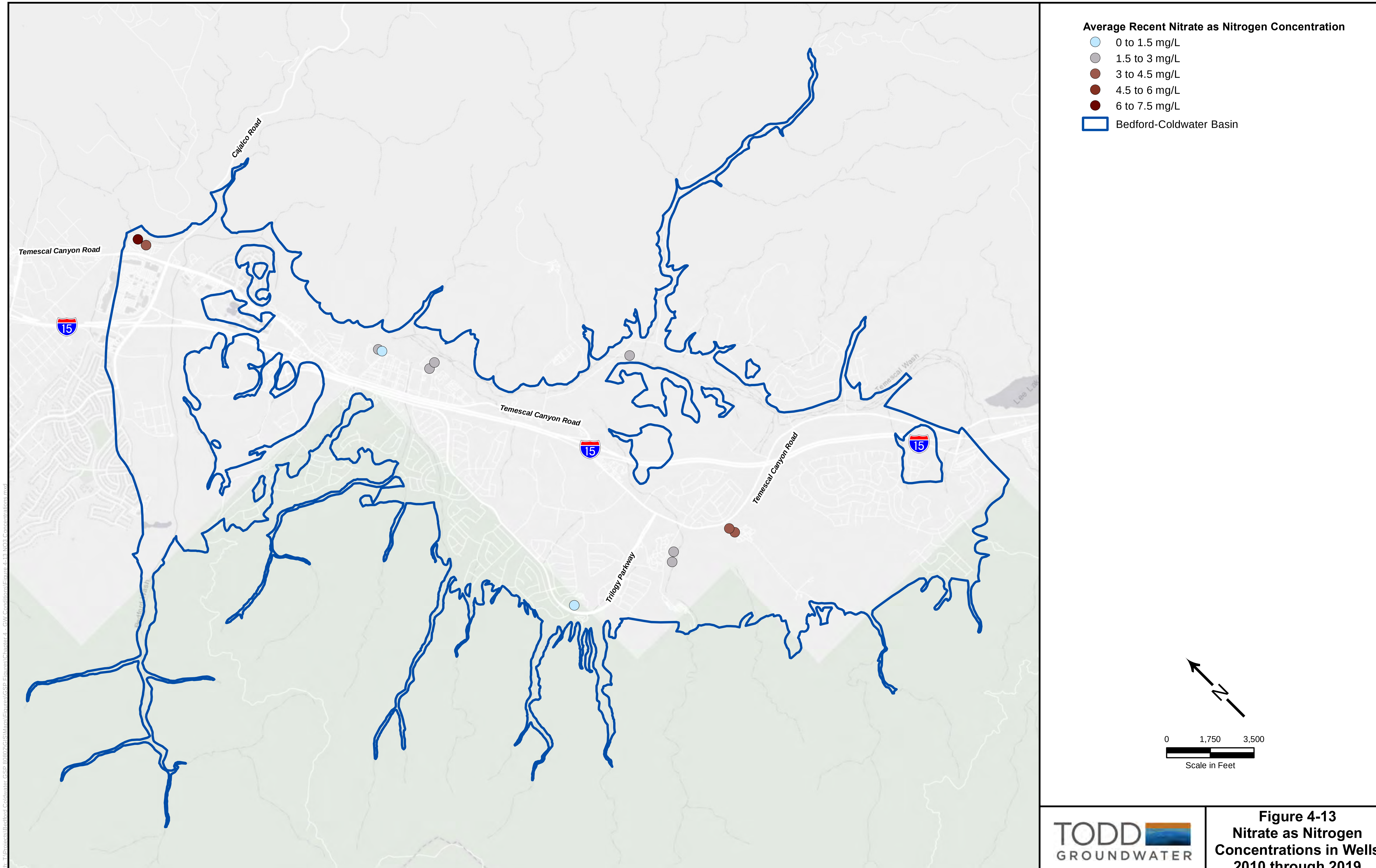
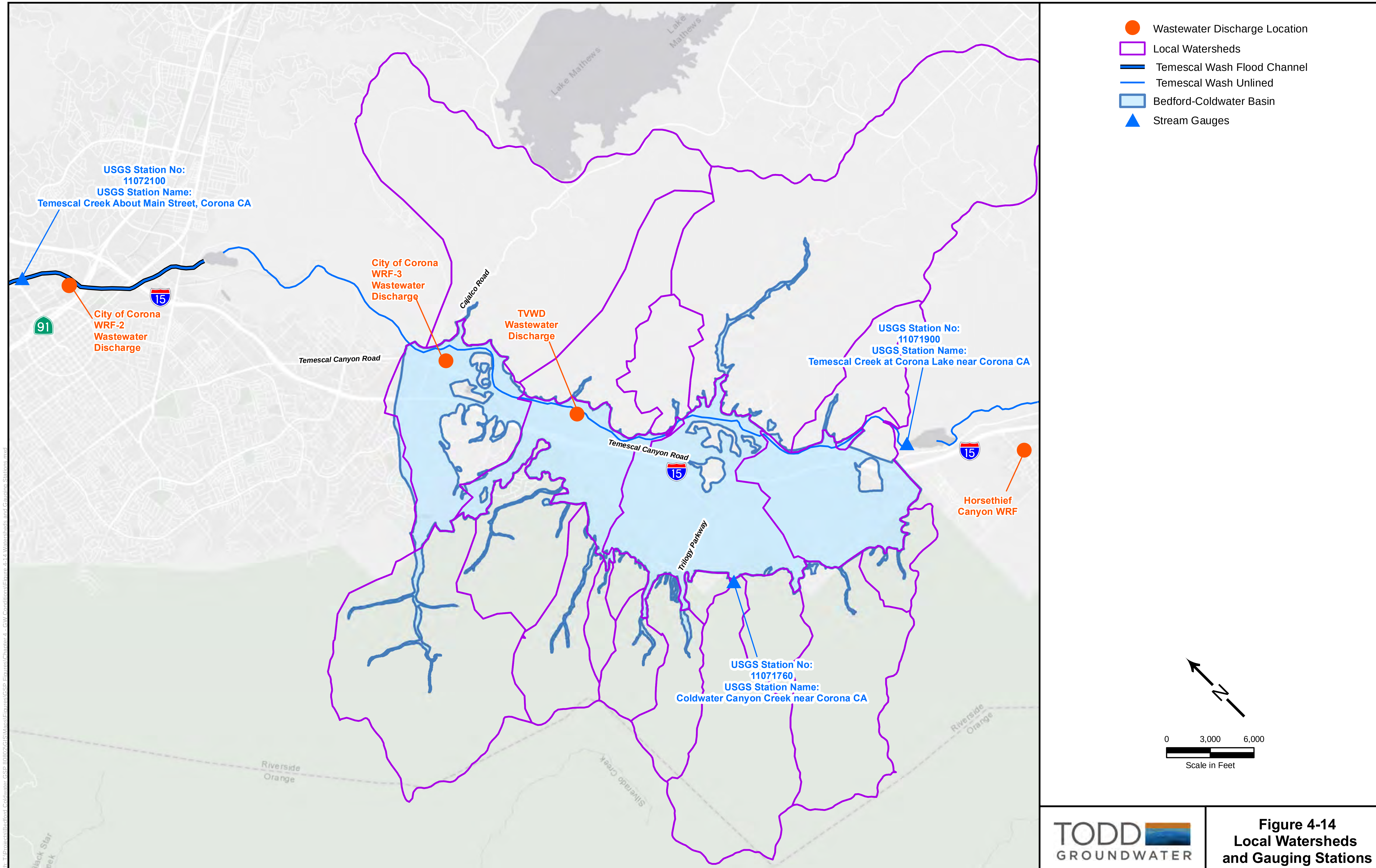


Figure 4-12
Total Dissolved Solids Concentrations in Wells 2010 through 2019



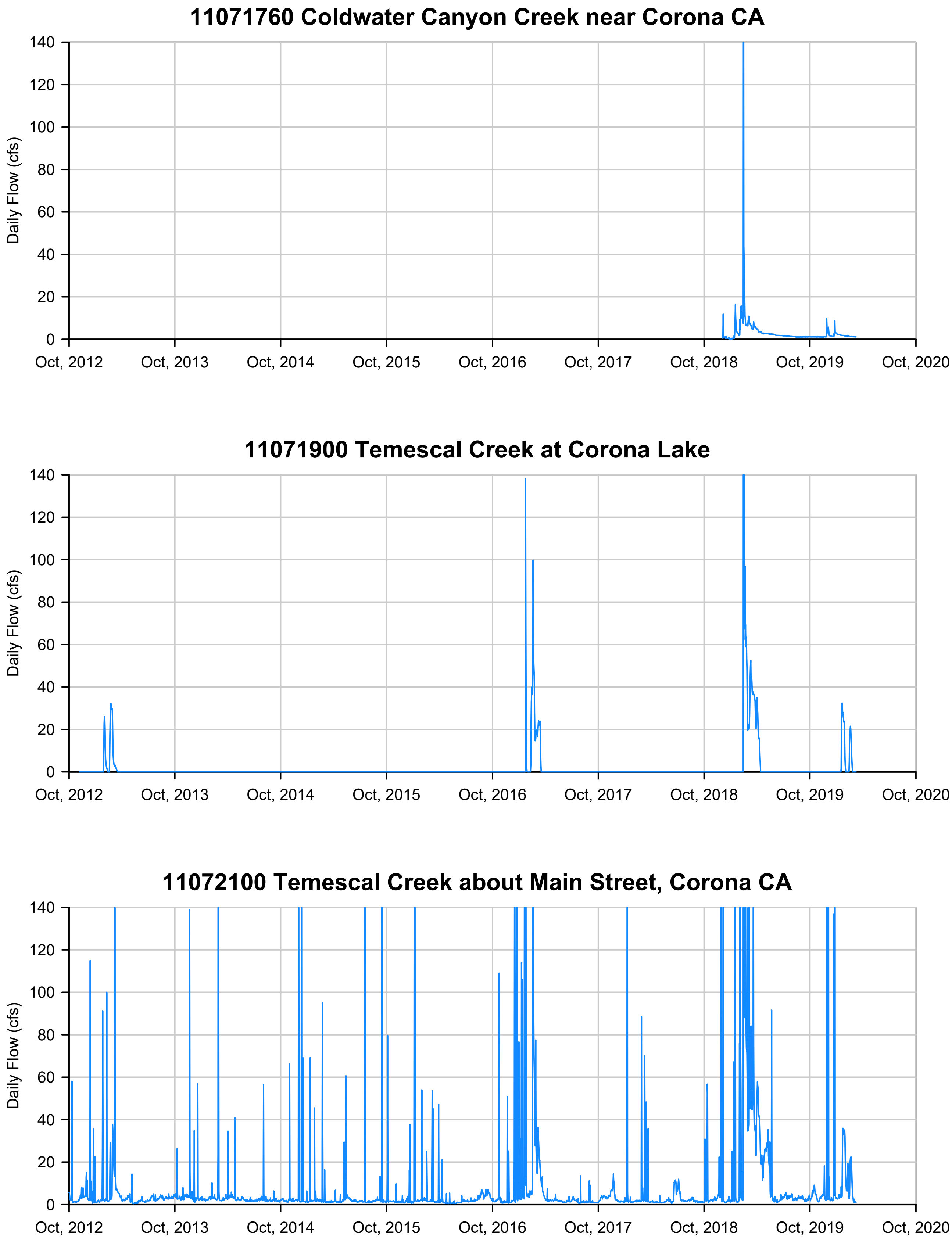
TODD GROUNDWATER

Figure 4-13
Nitrate as Nitrogen Concentrations in Wells 2010 through 2019



TODD GROUNDWATER

Figure 4-14
Local Watersheds and Gauging Stations



TODD GROUNDWATER

Figure 4-15
Local Streamflow
2013 through 2020

Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-15 Local Streamflow 2013 through 2020.gpj

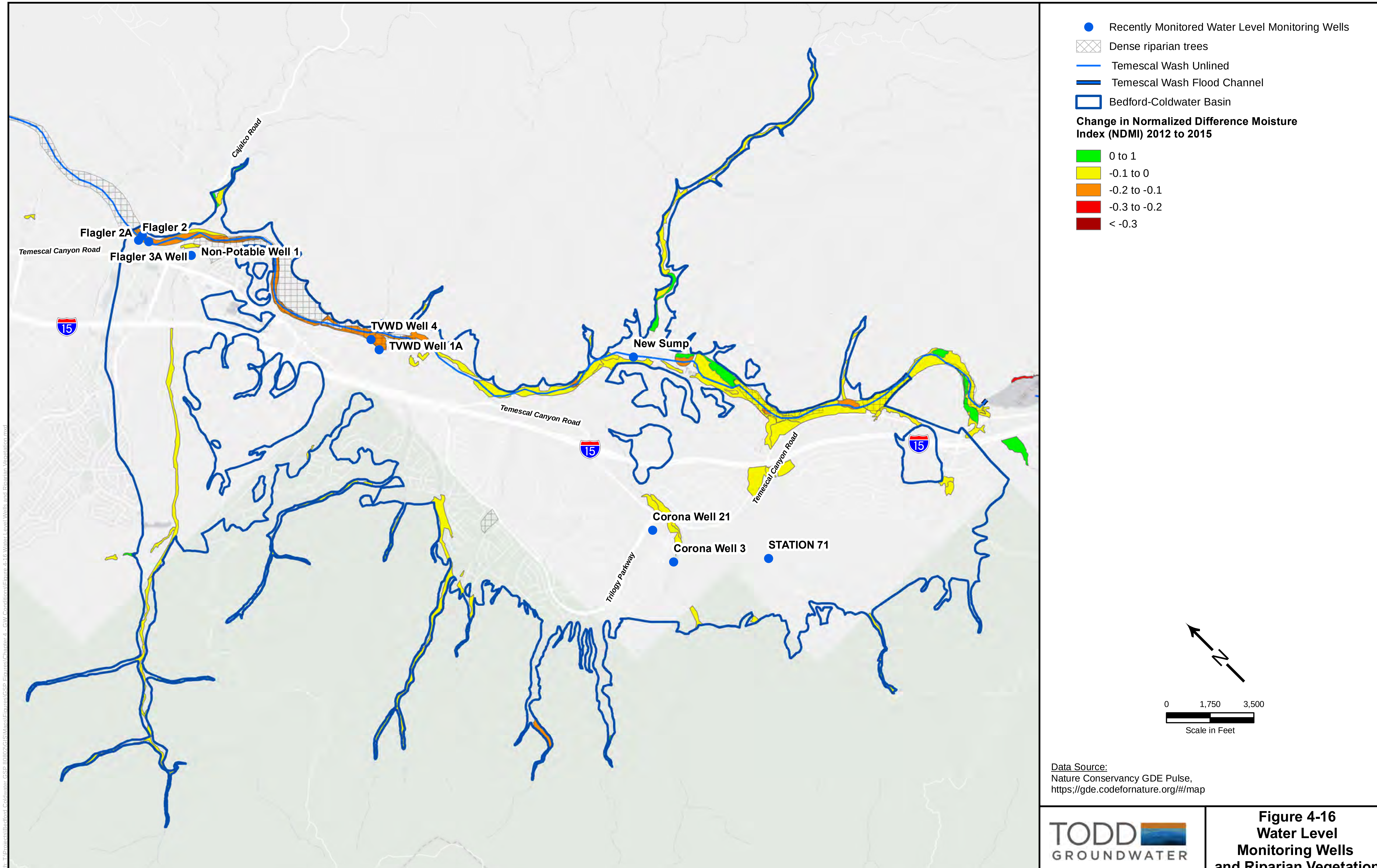
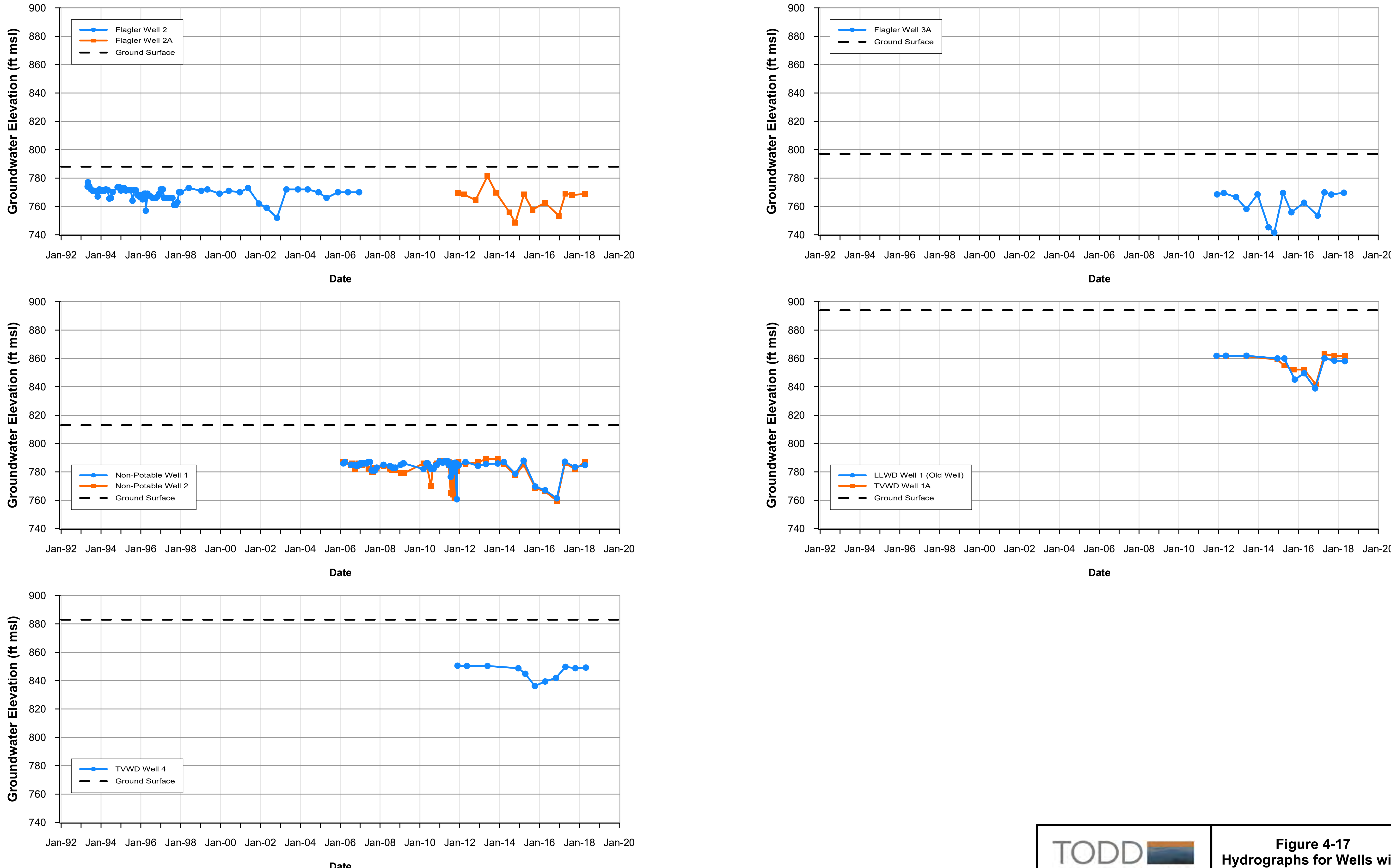


Figure 4-16
Water Level
Monitoring Wells
and Riparian Vegetation



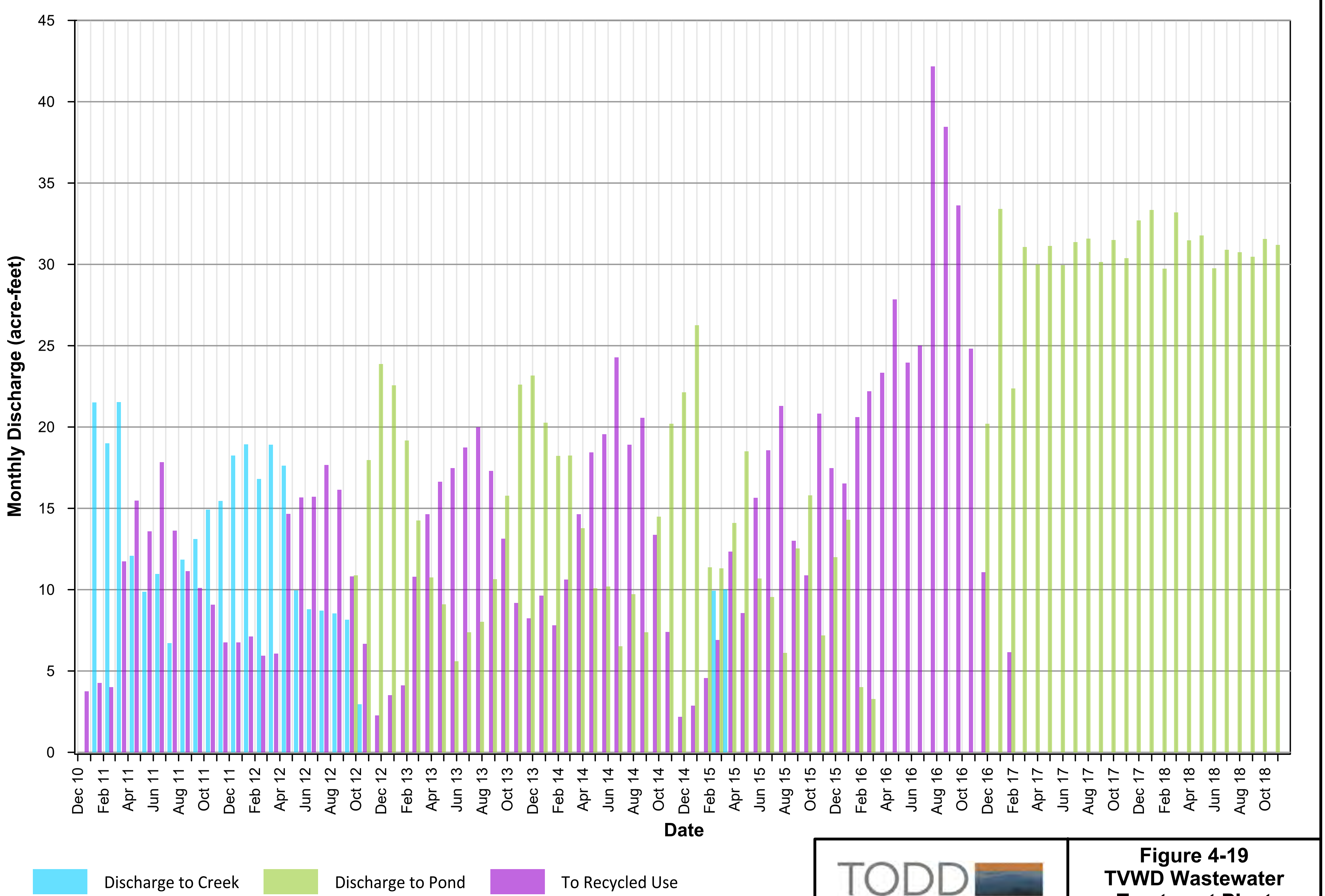
TODD GROUNDWATER

Figure 4-17
Hydrographs for Wells with Shallow Depth to Water

Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-17 Hydrographs for Wells with Shallow Depth to Groundwater.grf

TODD GROUNDWATER

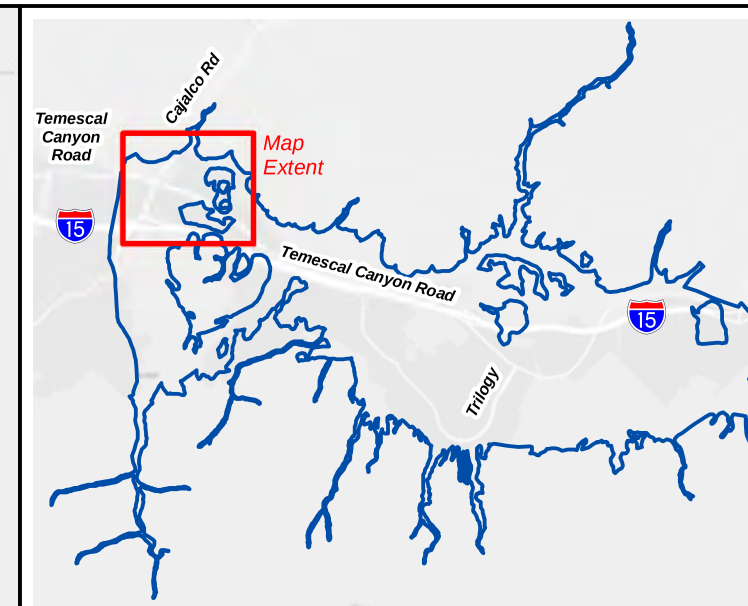
Figure 4-18
Recent Riparian Vegetation Aerial Imagery



TODD GROUNDWATER

Figure 4-19
TVWD Wastewater Treatment Plant Discharges, 2011 to 2018

Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 4-19 TVWD WW Discharge.gpj



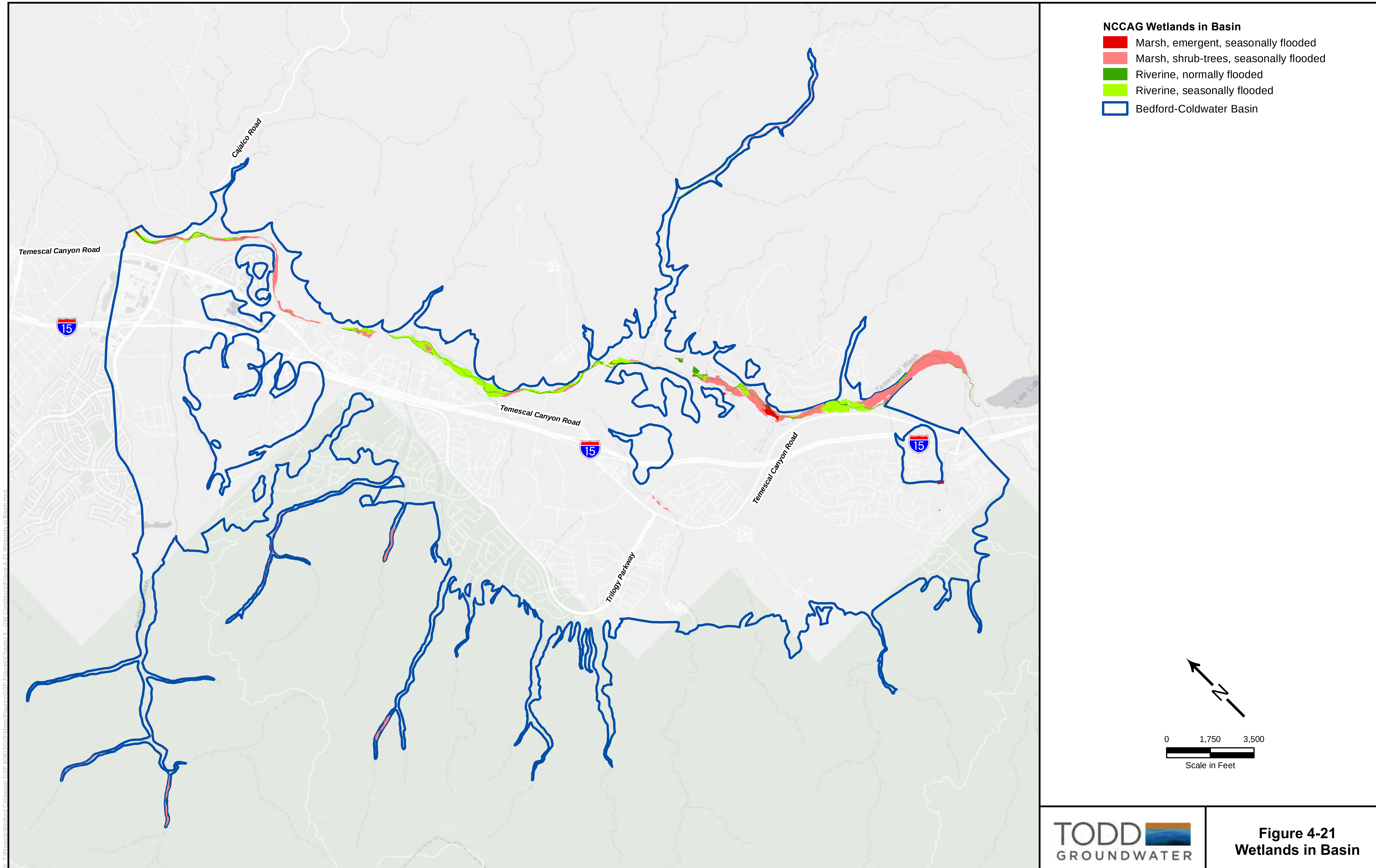
Bedford-Coldwater Basin

N

0 300 600
Scale in Feet

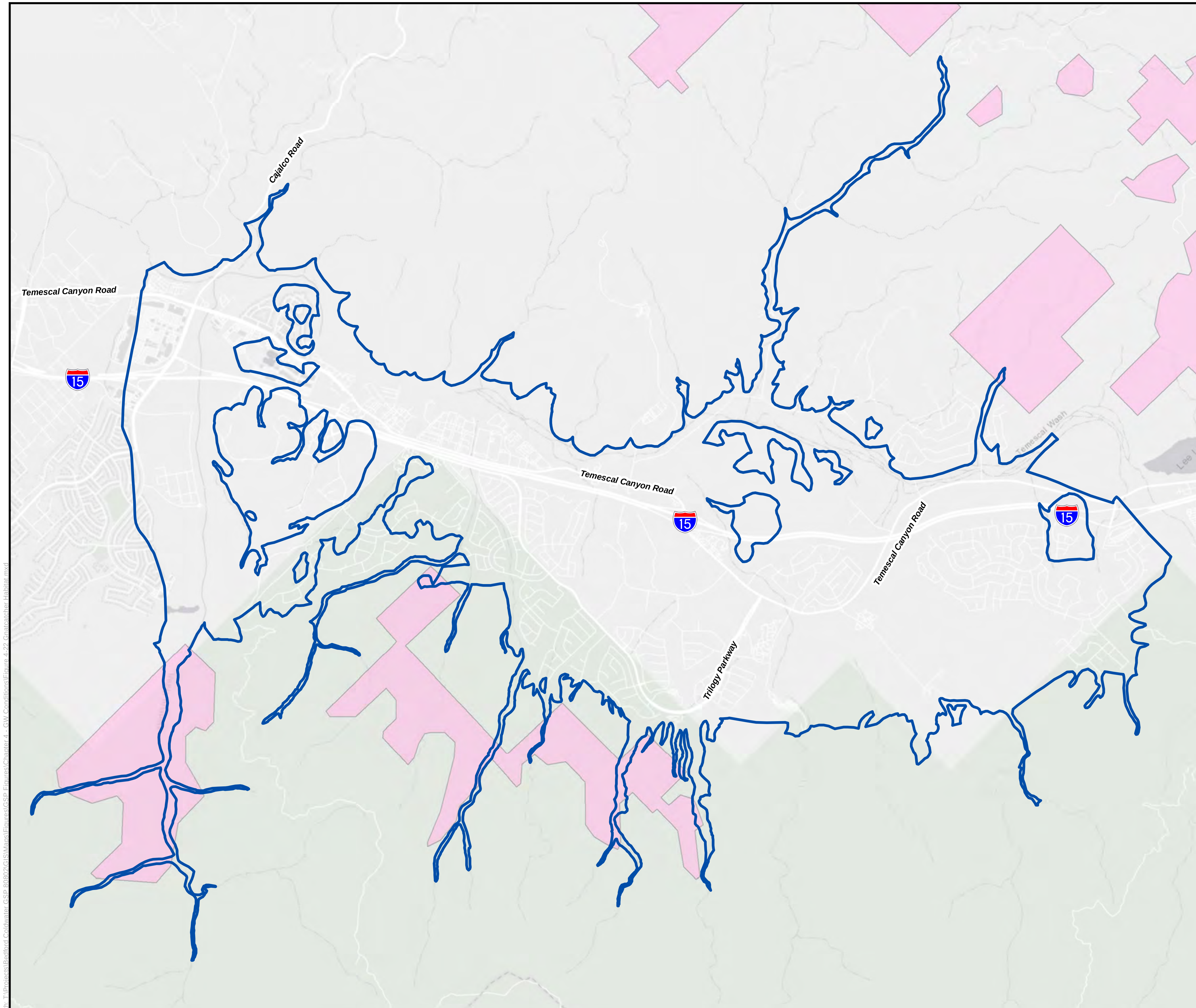
TODD GROUNDWATER

Figure 4-20
Aerial Photograph of Part of Temescal Wash in 1967



TODD GROUNDWATER

Figure 4-21
Wetlands in Basin



Data Source:
US Fish and Wildlife Service habitat map tool
https://ecos.fws.gov/ecp/report/table/critical-habitat.html

TODD GROUNDWATER

Figure 4-22
Coastal California Gnatcatcher Critical Habitat Area

5. WATER BUDGET

A water balance (or water budget) is a quantitative tabulation of all inflows, outflows, and storage change of a hydrologic system. The Sustainable Groundwater Management Act (SGMA) requires that water balances be prepared for the groundwater system and surface water system of a basin. If a basin contains multiple management areas, separate balances must be developed for each of them. Furthermore, water budgets must be developed for time periods representing historical, current, future no project (baseline), and future growth plus climate change (growth plus climate change) conditions.

This chapter presents the basis for selecting the water budget analysis periods, describes the boundaries and general characteristics of three management areas within the Bedford-Coldwater Subbasin (Basin), describes modeling tools used to estimate some water budget items, and presents the surface water and groundwater budgets.

5.1. WATER BUDGET METHODOLOGY

Annual balances were developed for water years 1990 through 2018, the period simulated by the numerical groundwater model. This interval was selected because it is a long hydrologic period for which important water budget data were available. The model is described in **Appendix E** and provides estimates for several components of the water balance for which direct measurements are not available: flows between groundwater and surface water bodies, flows to and from adjacent basins, evapotranspiration of riparian vegetation, and storage change. The numerical model allows a dynamic and comprehensive quantification of the water balance wherein all estimated water balance elements are reconciled and are calibrated to groundwater level changes over time. Accordingly, the numerical model is the best tool to quantify those water balance components. It will be updated regularly through the Groundwater Sustainability Plan (GSP) implementation process, providing a better understanding of the surface water-groundwater system and a tool to evaluate future conditions and management actions.

5.2. DRY AND WET PERIODS

Dry and wet periods in historical hydrology can be identified on the basis of individual years or sequences of dry and wet years. GSP Regulations require that each year during the water budget analysis period be assigned a water year type*,* which is a classification based on the amount of annual precipitation. **Figure 5-1** shows annual precipitation at Elsinore (National Oceanic and Atmospheric Administration (NOAA) Station GHCND:USC00042805) for water years 1899 through 2020. Water year types are also indicated and are assigned to five categories corresponding to quintiles of annual precipitation. The categories used here (dry, below normal, normal, above normal and wet) accurately describe the quintiles. These categories differ from the nomenclature commonly used in the Central Valley (critical, dry, below normal, above normal and wet) and elsewhere but do not accurately describe local categories and are based on the Sacramento River Index, which has little relevance to conditions in the Basin. The quintile divisions for precipitation during 1899 to 2020 at the Lake Elsinore station are shown in **Table 5-1**.

Table 5-1. Water Year Type Classification (Lake Elsinore station)

Water Year Type		Range as Percent of Mean	Precipitation Range (inches)
Wet	W	>139	> 16.5
Above Normal	AN	101 to 139	12.0 to 16.5
Normal	N	75 to 101	8.9 to 12.0
Below Normal	BN	56 to 75	6.6 to 8.9
Dry	D	<56	< 6.6

Average precipitation for 1899 to 2020 was 11.88 inches per year

Individual wet and dry years are not particularly useful for groundwater management in basins where groundwater storage greatly exceeds annual pumping and recharge, which is the case in the Basin. In those basins, multi-year droughts and sequences of wet years are more relevant, because they relate to the amount of operable groundwater storage needed to support sustainable groundwater management. Multi-year wet and dry periods can be identified from a plot of cumulative departure of annual precipitation, which is also shown on **Figure 5-1**. Wet periods appear as upward-trending segments of the cumulative departure curve, and droughts appear as declining segments. By far the largest climatic deviations in this record were the sustained wet conditions from 1937 to 1944 and dry conditions from 1946 to 1965. These events pre-dated the most recent 30 years, which is the period that the California Department of Water Resources (DWR) states should be used for determining year types (DWR 2016c). They also pre-date the period simulated by the groundwater model. However, large wet and dry events like those could recur in the future, and it is prudent to consider climate uncertainty in planning for groundwater sustainability.

5.3. WATER BALANCE ANALYSIS PERIODS

GSP regulations require evaluation of the water balances over historical, current, and future periods. The historical period must include at least 10 years, and the future period must include exactly 50 years. The duration of the current period is not specified, but to be consistent with SGMA concepts it needs to include several years around 2015, which was the implementation date of SGMA. Historical and current analysis periods for the Basin were selected from within the 1990 through 2018 modeling period. Ideally, each period is characterized by average precipitation and relatively constant land and water use. Urbanization in the Basin has been gradual throughout the 1990 to 2018 period. The historical period is represented by water years 1993 through 2007, and the current period by water years 2010 to 2013. Those periods had 101 percent and 102 percent of the 1899 to 2020 average annual rainfall, respectively.

The future period is intended to represent conditions expected to occur over the next 50 years. The model simulation period is only 29 years (1990 to 2018). To obtain a 50-year period, simulations of future conditions used the 1993 through 2017 sequence of rainfall and natural stream flow repeated twice. Average annual precipitation during 1993 to 2017 was 94 percent of the long-term average. For the baseline scenario, no adjustments were made to the hydrologic sequence. Adjustments made to simulate future climate change are described in following sections.

5.4. MANAGEMENT AREAS

As defined in the GSP regulations, a Management Area (MA) is an area within a basin for which the GSP may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. The Basin has been divided into two MAs. They are described below and in more detail in **Appendix G**, and their boundaries are shown in **Figure 5-2**.

5.4.1. Bedford Management Area

The Bedford MA occupies roughly the eastern two-thirds of the Basin. It is separated from the Coldwater MA by the Glen Ivy Fault, which is a partial barrier to groundwater flow. The Bedford MA connects to the Elsinore Subbasin in the south and the Temescal Basin at the north end of the Basin. Some subsurface inflow from the Elsinore Subbasin to the south, and subsurface outflow to the Temescal Basin is also possible. Temescal Wash flows along the length of the Bedford MA. It also exits the north end of the Basin but traverses a bedrock reach before entering the Temescal Basin.

5.4.2. Coldwater Management Area

The Coldwater MA is the part of the Basin west of the Glen Ivy Fault. Because of downward movement on that side of the fault, Basin thickness is much greater than in the Bedford MA. A large open-pit aggregate mine is located in the southern part of this MA. Several streams enter the Coldwater MA from watersheds on the eastern slopes of the Santa Ana Mountains.

5.5. METHODS OF ANALYSIS

Complete, itemized surface water and groundwater balances were estimated by combining raw data (rainfall, stream flow, municipal pumping, and wastewater percolation from septic tanks and wastewater treatment plant discharge) with values simulated using models[3].

[3] Water balance values are shown to nearest acre-foot to retain small items, but entries are probably accurate to only two significant digits.

Collectively, the models simulate the entire hydrologic system, but each model or model module focuses on part of the system, as described below. In general, the models were used to estimate flows in the surface water and groundwater balances that are difficult to measure directly or that relate to time-dependent groundwater levels. These include surface and subsurface inflows from tributary areas, percolation from stream reaches within the Basin, groundwater discharge to streams, potential subsurface flow from the neighboring subbasin and between MAs, the locations and discharges of pumping wells, consumptive use of groundwater by riparian vegetation, and changes in groundwater storage. Descriptions of the inflows and outflows to the surface water and groundwater models are included below in Sections 5.6 and 5.7.

5.5.1. Rainfall-Runoff-Recharge Model

This Fortran-based model developed over a number of years by Todd Groundwater staff simulates hydrologic processes that occur over the entire land surface, including precipitation, interception[4], infiltration, runoff, evapotranspiration, irrigation, effects of impervious surfaces, pipe leaks in urban areas, deep percolation below the root zone, and shallow groundwater flow to streams and deep recharge. The model simulates these processes on a daily time step for 242 “recharge zones” delineated to reflect differences in physical characteristics as well as basin and jurisdictional boundaries. Simulation of watershed areas outside the Basin is included to provide estimates of stream flow and subsurface flow entering the Basin. Daily simulation results were subtotaled to monthly values for input to the groundwater model. Additional details regarding the rainfall-runoff-recharge model can be found in **Appendix E** and the model code is available on request.

5.5.2. Groundwater Model

The groundwater flow model uses the MODFLOW 2005 code developed by the United States Geological Survey (USGS) that is a public domain open-source software as required by GSP regulation §352.4(f)(3). The model produces linked simulation of surface water and groundwater, as described below. Additional documentation of the model and calibration is provided in **Appendix E**.

5.5.2.1. Surface Water Module

Stream flow in MODFLOW is simulated using the Streamflow Routing Package (SFR) where a network of stream segments represents the small streams entering the Basin from Temescal Wash and tributary watersheds.

Surface water inflows to Temescal Wash were obtained from a similar groundwater flow model of the Elsinore Subbasin. Small stream inflows were estimated using the rainfall-runoff-recharge model. Each stream segment is divided into reaches, one per model grid cell traversed by the segment. Flow is routed down each segment from reach to reach. Along each

[4] Interception refers to precipitation that does not reach the soil, but instead falls on (and is intercepted by) plant leaves, branches, and plant litter, and is subject to evaporation loss.

reach mass balance is conserved in the stream, including inflow from the upstream reach and tributaries, inflow from local runoff, head-dependent flow across the stream bed to or from groundwater, evapotranspiration losses and outflow to the next downstream reach. Flow across the stream bed is a function of the wetted channel length and width, the bed permeability and the difference in elevation between the stream surface and groundwater at the reach cell. Wetted width and depth of the stream are functions of stream flow.

5.5.2.2. Groundwater Module

The MODFLOW groundwater model is constructed to cover the entire Basin. The model grid size is oriented at 40 degrees west of north (N40W) so that it is oriented consistent with the key hydrologic features including streams and faults. The model grid size uses a uniform 100 feet (ft) horizontal grid spacing to provide sufficient resolution to resolve hydraulic gradients, well drawdown cones, and groundwater-surface water interactions in the Basin.

The Basin extends up a number of narrow tributary stream canyons. These narrow canyons can be problematic to simulate using MODFLOW because they can cause difficult numerical stability issues. To limit these effects, the model grid extends up these canyons until the canyon is less than 3 grid cells wide, or to the extent where the alluvial sediments are regularly saturated. Areas upstream of these locations have been simulated using boundary conditions to estimate inflows based on groundwater conditions and surface water model results.

The numerical model has been constructed to reflect the hydrogeological conceptual model developed for the GSP. The vertical extent of the Basin is based on the mapped depth to consolidated rock. The elevation of surface features and streambed elevations have been derived from geographic information system (GIS) files developed from the local topography and stream information.

Citrus orchards irrigated with groundwater were common in the Basin in the early 1990s, but except for one small grove in the Coldwater MA those have all been replaced by urban development. The citrus orchards present in the early 1990s were almost all replaced by urban development by 2018. Agricultural irrigation pumping of these orchards was estimated by the rainfall-runoff-recharge model, with pumping assigned to a hypothetical irrigation well at the center of each irrigated recharge zone. This pumping was phased out over time as urban development occurred. Urban irrigation is supplied by the municipal water system, which uses imported water and local wells. Municipal well extractions are known and are entered directly into the model. All major pumpers in the Basin report their annual production to WMWD, which was the source of data for several non-municipal pumping wells. Pumping at private domestic wells is not reported and is not included in the model. The number of those wells is thought to be small, and their total production is almost certainly negligible in the context of the overall Basin water budget.

5.5.3. Simulation of Future Conditions

GSP regulations §354.18(c)(3) require simulation of three future scenarios to determine their effects on water balances, yield, and sustainability indicators. For this scenario, the growth and climate change scenarios were combined, resulting in the following two scenarios:

> **Baseline.** This represents a continuation of existing land and water use patterns, imported water availability, and climate.
>
> **Growth Plus Climate Change.** This scenario implements anticipated changes in land use and associated water use, such as urban expansion, and anticipated effects of future climate change on local hydrology (rainfall recharge and stream percolation) and on the availability of imported water supplies.

Both the future simulations assume a constant level of development and related water demand in the Basin. Development in the growth plus climate change simulation is not phased in over time. This is the best way to demonstrate whether 2068 land use is sustainable because it allows for assessment of the effects of variations in climactic conditions (wet and dry cycles) on groundwater conditions, avoids subjective decisions about the concurrent timing of droughts and development, and provides time for the full effect of future conditions on groundwater to become apparent.

5.5.3.1. Baseline Scenario

The baseline simulation is a 50-year period, as required by SGMA regulations, with water budget components developed using the criteria and assumptions described below. Initial water levels are simulated water levels for September 2018 from the historical calibration simulation. That year represents relatively recent, non-drought conditions. These simulated water levels are internally consistent throughout the model flow domain and reasonably matched measured water levels at wells with available data (see **Appendix E** for discussion of model calibration).

Surface water and other inflows came from multiple sources. Monthly inflows in Temescal Wash were obtained from the baseline and growth plus climate change simulations produced by the Elsinore Subbasin groundwater model (Carollo and Todd 2021), which is concurrently being used to develop the GSP for that Subbasin. Small stream and bedrock inflows simulated for 1993 to 2017 of the calibration model period were repeated twice to obtain 50 years of data.

In the baseline scenario, land use remains the same as the current conditions. In the model, land use is represented by 2014 land use mapped by remote sensing methods and obtained from DWR, adjusted for subsequent urbanization identified in Google Earth imagery.

Municipal, commercial, and industrial (M&I) and private pumping were assumed to remain at existing levels. Initial estimates were obtained by calculating average pumping for each calendar month during 2010 through 2018 and applying those averages in every year of the future simulation. This approach omits additions to and withdrawals from Coldwater MA storage accounts by the three municipal agencies with wells in that MA. Municipal use of imported water was also assumed to remain at existing levels. From the standpoint of the groundwater budget, total municipal water use was used only to estimate pipe leaks. Use of imported water by the Temescal Valley Water District (TVWD) was obtained from that agency's 2015 Urban Water Management Plan (RMC and Woodard & Curran 2017), and imported water use in the parts of the City of Corona (Corona) and Elsinore Valley Municipal Water District (EVMWD) service areas within the Basin were assumed to be the same on a per-acre basis for developed areas.

The Baseline scenario also assumes wastewater percolation and recycling continue as they have in recent years. Discharges from the TVWD Water Reclamation Facility (WRF) to Temescal Wash were discontinued in 2013. All of the plant outflow is recycled for irrigation during spring, summer, and fall (assumed April through November), and most or all of it is percolated in ponds at the WRF when irrigation demand is low (December through March).

5.5.3.2. Growth Plus Climate Change Scenario

The growth plus climate change scenario incorporated anticipated effects of climate change, urban development, and associated changes in water and wastewater management. In this scenario, rainfall and reference evapotranspiration (ET_0) were adjusted to 2070 conditions using monthly multipliers developed by DWR based on climate modeling studies. The multipliers were applied to historical monthly data for the 1993 to 2017 hydrologic period used in the model. DWR prepared a unique set of multipliers for each foursquare kilometer (km^2) cell of a grid covering the entire state. Nine climate grid cells overlie the Basin and its tributary watershed areas. For each recharge analysis polygon in the rainfall-runoff-recharge model, multipliers from the nearest climate grid cell were used. The climate in 2070 is expected to be drier and warmer than at present.

Figure 5-3 compares average monthly precipitation and ET_0 before and after applying the climate change multipliers. Simulations of irrigated turf in the rainfall-runoff-recharge model indicated that the combined effect of the warmer and drier climate will be to increase annual irrigation demand by about 10 percent.

In the growth plus climate change scenario, bedrock inflow and surface inflow from tributary streams along the perimeter of the Basin were re-simulated using the rainfall-runoff-recharge model to reflect the effects of urban development in some of the tributary watersheds and of climate change. Urbanization also increased surface runoff within the Basin, which was routed to small streams and Temescal Wash.

Projected land use in 2068, shown in **Figure 5-4,** was developed on the basis of population projections, land use designations in the Temescal Canyon Area Plan (Riverside County 2018), assumed urban infill, and topography. A comparison of land use acreage by land use category and management area for 1990, 2018, and 2068 is shown in **Table 5-2**. Conversion of grassland to residential land use was the dominant change in both management areas and also occurred in tributary watershed areas.

Total municipal water use in 2068 was estimated to be double the amount in 2018. This estimate is an approximate average of several factors. The Temescal Canyon Area Plan (Riverside County 2018) assigns developed land uses to almost the entire Basin area, and the area of undeveloped lands is presently about equal to the area of developed lands. Thus, the amount of developed land could plausibly double. However, the Area Plan also included estimates of future population that would extrapolate to a 2068 population only 58 percent greater than the current population. Finally, TVWD's 2015 Urban Water Management Plan (RMC and Woodard & Curran 2017) included projections of future water use out to 2040. Extrapolating those trends to 2068 indicates water use 1.55 times greater than in 2015.

For the growth plus climate change scenario, average annual groundwater pumping in the Coldwater MA was assumed to equal average historical pumping during 2010 through 2017, with an increase proportional to the estimated amount of irrigation return flow from future increased use of imported water. In the Bedford MA, average annual groundwater pumping was assumed to be equal to 2020 production volumes. Municipal pumping in Coldwater was distributed among wells in proportion to their averages during 2010 to 2017 and in Bedford it was distributed as recorded in 2020. All remaining municipal water use was assumed to be obtained from imported water.

Water pipe leak rates in the EVMWD and City of Corona service areas were assumed to decrease to 5 percent of delivered water from the rates reported in the 2015 Urban Water Management Plans (7.0 percent and 6.6 percent, respectively). The leak rate in the TVWD service area was assumed to continue at the low rate reported in 2015 (2 percent).

Wastewater generation was assumed to double by 2068, in proportion to the increase in total urban water use. Wastewater disposal was assumed to change, however. In recent years more of the outflow from the TVWD WRF has been percolated in ponds than has been recycled for irrigation. This proportion was assumed to reverse, such that all outflow would be recycled for irrigation during April through November and all would be percolated in ponds during November through March. The small discharge from Corona WRF-3 to Temescal Wash at the northern end of the Basin was assumed to be eliminated, consistent with the City of Corona's plans to decommission that WRF.

In the growth plus climate change scenario, mining operations were assumed to have ended and the mine areas to have been converted to stormwater control facilities with groundwater recharge capacity during high runoff periods.

Table 5-2. Bedford-Coldwater Basin Land Use in 1990, 2018 and 2068 (acres)

Land Use	Bedford MA			Coldwater MA			Tributary Watersheds		
	1990	2018	2068	1990	2018	2068	1990	2018	2068
Citrus	1,261	0	0	719	32	32	0	0	0
Grassland	2,403	1,603	413	187	103	33	16,703	16,429	16,174
Shrubs/Trees	368	144	64	173	138	82	13,777	13,693	13,693
Dense riparian	256	159	159	8	27	27	0	0	0
Sparse riparian	303	303	303	0	0	0	0	0	0
Open water	0	0	0	0	0	0	0	0	0
Low-density residential	199	529	485	66	88	88	0	0	0
Residential	179	1,379	2,725	76	405	606	0	94	327
Turf	7	263	326	0	170	226	0	85	107
Commercial	0	30	671	24	33	50	0	0	0
Industrial	232	469	469	0	0	0	0	0	0
Quarry	434	252	252	441	588	588	365	555	555
Vacant	785	1,232	561	38	148	0	0	0	0

5.6. SURFACE WATER BALANCE

This section describes and quantifies the water balance of creeks and rivers that cross the Basin. All significant inflows to and outflows from these surface water bodies are included in the water balance. The surface water balance shares two flows in common with the groundwater balance: 1) percolation from surface water to groundwater and 2) seepage of groundwater into surface water. Each of these is an outflow from one system and an inflow to the other.

Annual surface water balances during 1990 to 2018 were compiled from monthly data for each MA, and average annual water balances were calculated for each of the three analysis periods (1993 to 2007 and 2010 to 2013 for the historical simulation, and 2019 to 2068 for the future simulations). Key features of the surface water balances for each management area and analysis period are described below, followed by additional information about the methods used to quantify items in the water balances.

Historical annual surface water balances for the Bedford MA during 1990 to 2018 are shown in **Figure 5-5** (upper graph). Average annual surface water budgets for the model, historical, current, and future budget analysis periods are listed in **Table 5-3** and detailed surface water budget tables are included in **Appendix H**. Inflow occurs predominantly in wet years and derives from Temescal Wash, east side tributaries and runoff, and streams entering from the Coldwater MA, in descending order of magnitude. Outflow is almost entirely surface outflow in Temescal Wash to Temescal Basin.

In the baseline simulation, discharges of reclaimed water to Temescal Wash consisted only of the small flows from Corona WRF-3; TVWD WRF discharges had already ceased in 2013. Other inflows to the Bedford MA were close to the magnitudes of those flows during the historical and current periods. In the growth plus climate change scenario, Temescal Wash inflows from the Elsinore Subbasin were slightly larger due urbanization and wastewater discharges in that area. Local tributary inflows were slightly reduced due to the warmer, drier climate. There was little change in net stream percolation and outflow to the Temescal Basin.

Annual surface water balances for the Coldwater MA are also shown in **Figure 5-5** (middle graph) and **Table 5-3**. The only inflow of significance is from tributary streams draining the eastern slopes of the Santa Ana Mountains. Those inflows decreased somewhat under the growth plus climate change scenario because of warmer, drier climatic conditions. Less inflow led to less stream percolation (33 percent lower than historical) and less outflow to the Bedford MA (14 percent lower than historical).

A substantial amount of water is imported into the Basin. It is delivered directly to users and does not flow into streams or lakes. Imports began in 1992, and annual amounts since then are shown in **Figure 5-5** (bottom graph). Imported water consists of State Water Project (SWP) water purchased from the Metropolitan Water District of Southern California (Metropolitan) and delivered to TVWD through the Temescal Valley Pipeline.

Table 5-3. Average Annual Surface Water Budgets

Inflow or Outflow	Bedford Management Area				Coldwater Management Area			
	Historical 1993 to 2007	Current 2010 to 2013	Baseline[1] 2019 to 2068	Growth Plus Climate Change[1] 2019 to 2068	Historical 1993 to 2007	Current 2010 to 2013	Baseline[1] 2019 to 2068	Growth Plus Climate Change[1] 2019 to 2068
Inflows								
Temescal Wash	13,560	10,761	10,892	12,857	0	0	0	0
Tributary inflow	8,201	8,522	7,412	6,477	6,280	6,164	5,278	4,611
Wastewater discharges	712	1,227	60	0	0	0	0	0
Groundwater flow into streams	791	1,137	990	1,380	16	2	2	1
Total Inflows	23,264	21,646	19,354	20,714	6,296	6,166	5,279	4,612
Outflows								
Stream percolation	-1,564	-2,015	-1,661	-1,714	4,160	3,216	2,780	2,779
Surface outflows	-21,700	-19,631	-17,693	-19,000	2,136	2,950	2,499	1,834
Total Outflows	-23,264	-21,646	-19,354	-20,714	6,296	6,166	5,279	4,612

[1] The 50-year future baseline simulation uses historical hydrology for 1993 to 2017 two times in succession.

5.6.1. Inflows to Surface Water

5.6.1.1. Precipitation and Evaporation

Precipitation and evapotranspiration on the land surface are accounted for in the rainfall-runoff-recharge model. Those processes are not included in the surface water balances, which address only water in stream channels, lakes, and imported water. Precipitation and evaporation on the surface of creeks and rivers are invariably miniscule percentages of total stream flow and are not included in the water budget.

5.6.1.2. Tributary Inflows

Tributary inflows to the Basin are from Temescal Wash and tributary watersheds along the east and west sides of the Basin. Temescal Wash inflows were obtained from the Elsinore Subbasin groundwater model. Surface inflows from nine Santa Ana Mountain watersheds that discharge to the Coldwater MA were estimated using the rainfall-runoff-recharge model, with daily flows subtotaled to monthly flows for input to the groundwater model. Inflows from six eastside tributary watersheds that discharge to the Bedford MA were similarly simulated.

5.6.1.3. Valley Floor Runoff

The rainfall-runoff-recharge model simulates runoff from valley floor areas, which include impervious surfaces in urban areas. Runoff from valley floor areas was added to flows in tributary streams or Temescal Wash at several locations.

5.6.1.4. Wastewater Discharges

Reclaimed water was discharged from TVWD WRF to Temescal Wash beginning around 1991 and gradually increasing to about 2 cubic feet per second (cfs) during 2008 to 2012. Discharges ceased after that as TVWD increased its capacity to percolate the water in winter and recycle it for irrigation in summer. The City of Corona's WRF-3 discharges small amounts of reclaimed water to Temescal Wash near the downstream end of the Basin, averaging about 0.2 cfs but increasing to as much as 0.6 cfs in some winters. The City plans to decommission this plant and route its inflow to WRF-1 in the Temescal Basin in Corona.

5.6.1.5. Groundwater Discharge to Streams

Groundwater discharges into streams when the adjacent water table is higher than the stream bed or the water level in the stream. This occurs sometimes along Temescal Wash in the Bedford MA. Because groundwater levels fluctuate over time, estimates of these discharges were obtained from the groundwater model.

5.6.2. Outflows of Surface Water

5.6.2.1. Net Evaporation

Evaporation from streams is almost always a negligible fraction of total flow and is not explicitly itemized in the water budgets or simulated in the model.

5.6.2.2. Surface Water Percolation to Groundwater

In wet years, percolation from streams along the reaches between the Basin boundary and Temescal Wash is a significant outflow of surface water. Along Temescal Wash in the Bedford MA, the Wash gains flow from groundwater in some reaches and loses it to groundwater in others, depending on the relationship between the stream surface and adjacent groundwater table. These exchanges vary in time as well as location, but over the long run they are of generally similar magnitudes. Because of this dynamic interaction between surface water and groundwater, estimates of flows across the bed of Temescal Wash were obtained from the groundwater model.

5.6.2.3. Surface Outflow from Management Areas and the Basin

Surface outflow from the Coldwater MA to the Bedford MA was calculated by subtracting net percolation losses along the tributary streams from their inflows at the Basin boundary. The net losses were simulated by the groundwater model. Surface outflow in Temescal Wash to the Temescal Basin was calculated as the residual in the surface water balance for the Bedford MA.

5.7. GROUNDWATER BALANCE

Annual groundwater inflows and outflows for each management area for the 1990 to 2018 model simulation period are shown as stacked bars in **Figure 5-6**. Inflows are stacked in the positive (upward) direction and outflows are stacked in the negative (downward) direction. A similar stacked-bar chart for the baseline simulation is shown in **Figure 5-7** and for the growth plus climate change simulation in **Figure 5-8**. Average annual groundwater budgets for each MA and budget analysis period are listed in **Table 5-4** and detailed groundwater budget tables are included in **Appendix H**. Highlights of the water budgets are described below, followed by additional information on methods used to quantify each budget item.

In the Bedford MA, the major inflow is percolation from streams especially during wet years. In recent years (2012 to 2018), reclaimed water percolation has become another major inflow. The major outflows include M&I pumping and groundwater discharge to streams. Historically, agricultural pumping also has contributed to outflow from the basin but decreased to a negligible amount by 2007.

Percolation from streams—principally Temescal Wash—was similar across all analysis periods. This was because Temescal Wash inflows increased under the growth plus climate change scenario, offsetting decreased inflow from local tributary streams. Meanwhile, total pumping increased by 71 percent from the historical to the growth plus climate change scenario, which resulted in a slight increase in induced percolation from the Wash. The small increase in bedrock inflow under the growth plus climate change scenario was because urbanization of parts of the tributary watersheds produced enough additional recharge to more than offset the effects of climate change. Subsurface inflow progressively decreased and subsurface outflow increased from the historical period to the growth plus climate change scenario. This was caused by declining water levels in the Coldwater MA, which reversed the direction of flow across the boundary between the MAs around the end of the historical period. Recharge from pipe leaks roughly doubled due to urbanization but remained a small fraction of total inflows (five percent) because of TVWD's low reported pipe leak rate.

Overall in the Bedford MA, both future scenarios show increases in reclaimed water percolation.

Outflows in both scenarios also increased. The net result is a slightly decreased change in storage over the historical period, but the basin is still expected to have a positive change in storage (more inflow than outflow) under future conditions, even under growth and climate change projections.

In the Coldwater MA, percolation from streams occurs as infrequent, episodic events. As shown in **Figure 5-6**, percolation can range from 15,000 acre-feet (AF) in wet years to no stream percolation in dry years. M&I pumping has dominated basin outflows although it has decreased from its peak in the late 1990s. Similar to the Bedford MA, agricultural pumping was an outflow historically but decreased to negligible by 2001.

The differences between the historical, current, and future scenarios stem mostly from the years selected for inclusion in the averaging. Bedrock inflow decreased slightly in the growth plus climate change scenario because of the warmer, drier climatic conditions. The increase in dispersed recharge on both irrigated and non-irrigated lands under the growth plus climate change resulted from urbanization. A fraction of runoff from impervious surfaces is assumed to flow to adjacent pervious soils, creating localized concentrated recharge. This was included in the recharge for non-irrigated lands. As in the Coldwater MA, pipe leaks increased due to urbanization but remained only four percent of total inflows.

Overall in the Coldwater MA, in both future scenarios inflows significantly increase from dispersed rechange over non-irrigated land. Outflows are expected to decline as M&I pumping is projected to be limited in the future based on agreements between the GSA agencies. The combined increased inflow and decreased outflow results in significantly increased storage in future conditions, which reverses the historical water level declines in the Coldwater MA.

Table 5-4. Average Annual Groundwater Budgets

	Bedford Management Area					Coldwater Management Area				
Water Balance Items	Historical 1993 to 2007	Current 2010 to 2013	Historical 1993 to 2017	Baseline[1] 2019 to 2068	Growth Plus Climate Change[1] 2019 to 2068	Historical 1993 to 2007	Current 2010 to 2013	Historical 1993 to 2017	Baseline[1] 2019 to 2068	Growth Plus Climate Change[1] 2019 to 2068
Groundwater Inflow										
Subsurface inflow	480	103	353	102	93	10	90	41	34	48
Percolation from streams	1,564	2,015	1,516	1,661	1,714	4,160	3,216	3,327	2,780	2,779
Bedrock inflow	867	816	819	776	828	583	526	536	467	435
Dispersed recharge: non-irrigated land	776	1,040	740	929	1,031	327	487	330	1,164	1,575
Dispersed recharge: irrigated land	792	578	674	559	940	468	336	396	289	396
Pipe leaks	126	156	143	33	92	30	39	35	17	32
Reclaimed water percolation	391	587	638	1,868	2,161	0	0	0	0	0
Quarry recharge	85	21	92	162	471	0	0	0	0	0
Total Inflow	**5,080**	**5,315**	**4,974**	**6,090**	**7,331**	**5,579**	**4,694**	**4,665**	**4,751**	**5,264**
Groundwater Outflow										
Subsurface outflow	-179	-370	-205	-498	-423	-92	0	-55	-15	-7
Wells - M&I and domestic	-1,235	-577	-1,110	-1,315	-1,895	-5,802	-2,969	-4,787	-3,002	-3,072
Wells - agricultural	-728	-65	-460	0	0	-929	-186	-623	-40	-88
Groundwater discharge to streams	-791	-1,137	-786	-990	-1,380	-16	-2	-10	-2	-1
Riparian evapotranspiration	-482	-732	-512	-760	-1,015	-285	-234	-281	-154	-168
Quarry Operations / Losses	-1,447	-1,845	-1,663	-2,422	-2,466	-606	-595	-653	0	0
Total Outflow	**-4,863**	**-4,726**	**-4,737**	**-5,986**	**-7,179**	**-7,730**	**-3,986**	**-6,410**	**-3,212**	**-3,337**
Net Change in Storage										
Inflows minus outflows	217	589	237	104	152	-2,152	708	-1,744	1,539	1,927

[1] : The 50-year future simulation uses historical hydrology for 1993 to 2017 two times in succession.

5.7.1. Inflows to Groundwater

Inflows to the groundwater flow system in both MAs are dominated by rainfall recharge and stream percolation, which vary widely from year to year depending on hydrologic conditions. Variations in bedrock inflow from tributary watersheds is steadier because flow through fractured bedrock in those watersheds attenuates the recharge pulses that occur in wet years. Urban sources of recharge including irrigation return flow and pipe leaks are less variable from year to year but gradually increased during the simulation period in parallel with urban growth.

5.7.1.1. Dispersed Recharge from Rainfall and Irrigation

Dispersed recharge from rainfall and applied irrigation water is estimated by the rainfall-runoff-recharge model. The model simulates soil moisture storage in the root zone, with inflows from rainfall infiltration and irrigation, and outflows to evapotranspiration and deep percolation. Simulation is on a daily basis. In recharge zones with irrigated crops—which includes urban landscaping and agricultural irrigation (citrus)—irrigation is assumed to be applied when soil moisture falls below a certain threshold. When soil moisture exceeds the root zone storage capacity, the excess becomes deep percolation. Rainfall and irrigation water comingle in the root zone and in deep percolation. For the purposes of displaying an itemized water balance, the amount of deep percolation derived from irrigation is estimated as a percentage of the simulated irrigation quantity, and the remainder of the dispersed recharge is attributed to rainfall. Deep percolation of applied irrigation water (irrigation return flow) is generally similar from year to year, whereas rainfall percolation varies significantly on an annual basis. Because urban landscape irrigation increased while agricultural irrigation decreased during the simulation period, total recharge on irrigated lands decreased only slightly. Water pipe leaks were estimated as the percentage of unaccounted for water listed in the 2015 Urban Water Management Plan (eight percent of delivered water, RMC and Woodard & Curran), distributed uniformly over areas of urban land use. Sewer pipes convey only water used indoors, and their leak rate was assumed to be half of the leak rate for water pipes. The one-dimensional dispersed recharge rates are multiplied by the surface area of each recharge zone to obtain volumetric flow rates, and those are subtotaled by management area.

Figure 5-9 shows a map of average annual dispersed recharge during 1993 to 2007. Although this period does not reflect the most current land use, it is a relatively long averaging period that includes a wide range of year types. Most dispersed recharge occurs during relatively wet years. Average annual recharge rates ranged from less than 0.4 to slightly over 13 inches per year (in/yr). Within the Basin, land use had the largest effect on recharge, with residential land uses having relatively high rates because of landscape irrigation, pipe leaks and percolation of a fraction of the runoff from impervious areas. In tributary watershed areas, partitioning of deep percolation beneath the root zone into stream base flow versus groundwater recharge had a strong influence on simulated recharge. In watersheds on the east side of the Basin, a higher percentage of deep percolation was assigned to base flow than in watersheds on the west side of the Basin in order to better match observed stream flows.

5.7.1.2. Percolation from Streams

Inflows to the stream network in the surface water module of the groundwater model include a combination of gauged flows, and simulated runoff from tributary watersheds and valley floor areas obtained from the rainfall-runoff-recharge model.

The surface water module of the groundwater model simulates percolation reach by reach along each stream that crosses the basin, including Temescal Wash and small streams emanating from 15 watersheds around the periphery of the Basin. Percolation is affected by groundwater levels where the water table is equal to or higher than the elevation of the stream bed. This is sometimes the case along Temescal Wash, but the small tributary streams are mostly high above the water table elevation except up in the canyons where they first enter the Basin.

5.7.1.3. Reclaimed Water Percolation

Reclaimed wastewater is percolated in ponds at the TVWD WRF and the City of Corona's WRF-3. However, most of the reclaimed water is recycled for irrigation. Annual or monthly data describing the partitioning of reclaimed water into irrigation, pond percolation and discharge to Temescal Wash were obtained from TVWD and the City of Corona.

5.7.1.4. Subsurface Groundwater Inflow

Subsurface inflow from an adjacent MA or a neighboring basin is simulated by the groundwater model based on water level gradients and subsurface permeability along the boundary segments. In the Coldwater MA, the only such boundary is the Glen Ivy Fault, and flow across that boundary is almost entirely outward to the Bedford MA. In addition to the Glen Ivy Fault, the Bedford MA receives a small among of subsurface inflow from the Elsinore Subbasin and generates a small amount of outflow to the Temescal Basin. Small amounts of subsurface inflow to both MAs also occurs where they abut upland tributary watersheds. Recharge in those watersheds flows toward the Basin through fractures in bedrock. This process is simulated by the rainfall-runoff-recharge model.

5.7.1.5. Quarry Recharge

Quarry recharge represents inflows of surface water into existing quarries where it is allowed to recharge into the groundwater. In the Coldwater MA, streamflow from Mayhew Creek and some other smaller streams is directed into existing quarry areas where the water is contained and allowed to percolate. Coldwater Creek has been redirected around an existing quarry. Although Coldwater Creek is not currently directed into a quarry, there have been historic instances where flood flows have gone into the quarries, especially prior to 2005. A portion of the estimated streamflow from the rainfall-runoff-recharge model for each stream is recharged to groundwater at the quarry location.

Similarly, in the Bedford MA, streamflow from Brown and McBride Creeks flows into the Mobile Sand quarry located just north of the TVWD WRF. In addition, streamflow from Temescal Wash can flow into the quarry location especially during high and flood flows. The quarry pit at this location is below the water table and is consistently flooded. To estimate the recharge, the MODFLOW model applies a boundary condition based on the observed water level in the pit to estimate the volume of quarry recharge.

5.7.2. Outflows from Groundwater

Major outflows from the Basin are groundwater pumping (municipal, industrial, agricultural, and domestic), groundwater discharge into streams, and evapotranspiration by riparian vegetation.

5.7.2.1. Pumping by Wells

Pumping from M&I wells has been measured and recorded for many years by TVWD and Western. Those data are used in the groundwater model. Total pumping for both MAs was about 11,000 (acre feet per year) AFY in the 1990s and decreased to around 3,000 AFY by 2018. This trend was caused by the replacement of groundwater-supplied citrus orchards to urban land uses supplied almost entirely by imported water. In the Bedford MA, TVWD pumps groundwater to supplement recycled water used for irrigation. In the Coldwater MA, groundwater is pumped and exported for municipal use in the Elsinore Subbasin and Temescal Basin by EVMWD and the City of Corona. Pumping is expected to remain around current volumes in the Coldwater MA, consistent with the existing agreement between Corona and EVMWD. However, pumping in the Bedford MA is expected to increase to accommodate future TVWD non-potable water demands.

5.7.2.2. Subsurface Outflow

Subsurface outflows to other MAs or external basins were calculated with the groundwater model by the same methods used to simulate subsurface inflows. The two outflow boundaries are from the Coldwater MA to the Bedford MA and from the Bedford MA to the Temescal Basin. Both of those flows are minor components of the water budget (one to four percent of total outflows).

5.7.2.3. Groundwater Discharge to Streams

Discharges from the Basin to surface water bodies are simulated by the groundwater model based on streambed wetted area, permeability, and on the amount by which the simulated groundwater elevation in a model stream cell is higher than the simulated surface water elevation. This probably occurs at times along Temescal Wash, although dry-season Google Earth aerial photographs rarely show open water in the channel. The groundwater model simulated groundwater discharge to Temescal Wash that averaged 16 percent of total outflow from the Bedford MA during 1993 to 2007.

5.7.2.4. Riparian Evapotranspiration

Evapotranspiration of groundwater by phreatophytic riparian vegetation is influenced by available soil moisture and by depth to the water table. Like other types of vegetation, phreatophytes use soil moisture supplied by rainfall when it is available. Any remaining evapotranspiration demand is met by drawing water from the water table. Phreatophyte use of groundwater is assumed to decrease from the maximum rate when the water table is at the land surface to zero when the water table is 20 feet or more below the ground surface. These calculations are applied at all model cells, but non-zero amounts only occur where the depth to water is commonly less than 20 feet. Aerial photographs indicate a correlation between those areas and the presence of dense, lush riparian vegetation.

Riparian evapotranspiration (ET) was a relatively minor component of groundwater outflow in both MAs—averaging four percent of total outflows from the Coldwater MA and 10 percent of total outflows from the Bedford MA.

5.7.2.5. Quarry Operations and Losses

Quarry outflows represents outflows associated with active or passive quarry operations to account for observed water conditions within the deeper quarry pits. In the Coldwater MA, excavations continued within the large quarry pits following periods of high groundwater levels for the period from 1990 to 2010. During model calibration, it was necessary to assume that additional pumping or other groundwater removal occurred during these operational periods to maintain the observed groundwater levels. Since 2010, it is our understanding that no additional pumping to maintain quarry water levels at the elevations necessary for deepening pits has occurred, which is supported by the historical model calibration.

In the Bedford MA, the rim of the Mobile Sand quarry located just north of the TVWD WRF is low enough to allow surface flow between the pit and Temescal Wash when water levels in the pit or Wash are high. To estimate these flows, the groundwater model applies a boundary condition based on the observed water levels in the pit and Wash to estimate the volume of into or out of the pit. This is a head-dependent boundary condition that is able to calculate either quarry recharge or outflow based on groundwater conditions.

5.8. CHANGE IN GROUNDWATER STORAGE

Figure 5-10 shows the cumulative change in storage from the model for the two Management Areas during 1990 through 2068. The baseline and growth plus climate change scenario results for 2019 to 2068 are displayed as continuations of the historical storage changes from 1990 to 2018.

As shown, groundwater storage in the Bedford MA increased slightly during 1990 to 2018, presumably as a result of the decrease in total groundwater pumping. Consistent with total simulated inflows and outflows, the storage trend during 2019 to 2068 was level to slightly increasing for both future scenarios. Storage was slightly higher during droughts under the growth plus climate change scenario relative to the future baseline scenario. This is because urban recharge continues during droughts. High recharge in wet years tended to reset storage for both scenarios to a similar elevation that is partly limited by interaction with Temescal Wash.

Simulated historical storage in the Coldwater MA declined by a cumulative total of 60,000 AF from 1990 to 2004. EVMWD and Corona entered into an agreement to limit pumping in the MA to safe or sustainable yield in 2008 (Corona and EVMWD 2008). As a result, there was little additional cumulative decline from 2005 to 2018. As a result of decreased pumping, storage under both future scenarios increased steadily from 2019 to 2068. Inflows exceeded outflows in the water budget because of increased urban recharge and continued limitation of pumping. The rate of storage increase was slightly higher under the growth plus climate change scenario relative to the baseline scenario, which can be attributed to increased urban return flow recharge.

5.9. ESTIMATE OF SUSTAINABLE YIELD

The sustainable yield is defined as the volume of pumping that the Basin can sustain without causing undesirable effects. It is not a fixed or inherent natural characteristic of a groundwater basin. Rather, it is influenced by land use activities, importation of water, wastewater and stormwater management methods, potential recharge with recycled water, and the locations of wells with respect to interconnected streams. The estimates of sustainable yield presented in this section reflect the current status of those variables under the historical and future scenarios and evaluates whether there would be a long-term increase or decrease in basin storage if those conditions continued over a 50-year future period.

A long analysis period is needed to evaluate yield because of the episodic nature of natural recharge. Whereas pumping, irrigation return flow, and pipe leaks are fairly constant from year to year, recharge from precipitation and streams varies widely. Because of evolving land use during 1990 to 2018, no subset of years is ideal for estimating sustainable yield. For the purposes of this GSP historical sustainable yield was calculated based on 1993 to 2017, which is representative of long-term average conditions in terms of precipitation and stream flow. Sustainable yield was estimated for each management area for the historical simulation (using 1993 to 2017) and the two future simulations (both using all 50 years of the simulation). A simple estimate of sustainable yield can be obtained by adding average annual pumping to average annual change in storage, as shown in **Table 5-5**.

Table 5-5. Estimated Sustainable Yield

	Sustainable Yield (acre-feet per year)		
Management Area	**Historical 1993 to 2017[1]**	**Baseline 2019 to 2068[2]**	**Growth Plus Climate Change 2019 to 2068[2]**
Bedford	1,808	1,419	2,047
Coldwater	4,319	4,581	5,088
Total	6,127	6,000	7,134

[1] For the historical sustainable yield estimate, average annual water budgets during 1993 to 2017 were used.
[2] The 50-year future simulation uses historical hydrology for 1993 to 2017 two times in succession.

The baseline simulation generally produces a better estimate of sustainable yield for planning purposes because it incorporates existing land and water use patterns and a long averaging period that more completely captures climatic and conjunctive use cycles. The sustainable yield under baseline conditions was estimated by the same method used for the historical budget analysis period: simulated average annual storage change over the 50-year simulation was added to average annual pumping for each MA.

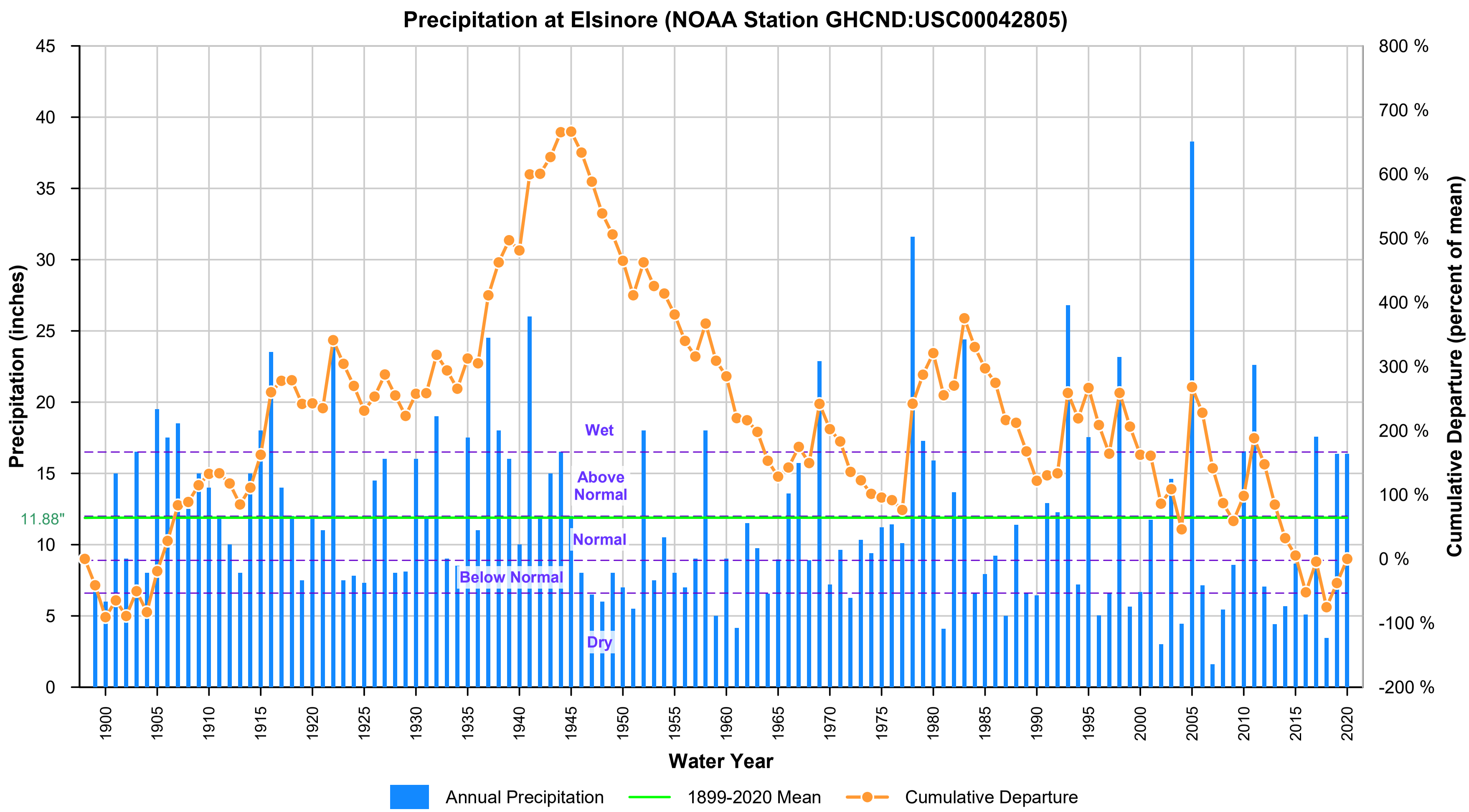
This method of estimating sustainable yield ignores head-dependent responses to pumping in the water budget. In other words, storage change is not the only variable that responds to an increase in pumping. In reality, the response is spread out among storage change, subsurface inflow, subsurface outflow, percolation from streams and groundwater seepage into streams. If those head-dependent boundaries are major parts of the flow system, then an increase in pumping will result in an increase in the estimate of sustainable yield. This boundary interaction effect was not revealed in the Coldwater MA because head-dependent boundary flows there are relatively minor. However, the simulations in the Bedford MA show some variability in sustainable yield as a result of variable pumping in the simulations. The sustainable yield estimates for the Bedford MA understate sustainable yield because of the high degree of interconnection between groundwater and surface water in Temescal Wash. Additional pumping increases net percolation from the Wash at times when the Wash is flowing. This increase in recharge approximately balances increased pumping, thereby preventing a long-term decrease in storage. This situation results in higher estimates of sustainable yield, as shown in the Bedford MA growth plus climate change sustainable yield in Table 5-5.

The estimates of sustainable yield presented here for the two management areas differ from previous estimates that had different objectives. A previous study of groundwater development potential for the Bedford MA quantified many aspects of the water budget but did not explicitly state an estimated sustainable yield (WEI 2015b). It was asserted that a yield estimate based on historical data would not be representative of future conditions and that future pumping and recharge could strongly affect net percolation from Temescal Wash and therefore also the calculated sustainable yield. The study also did not discuss recharge and pumping related to mining activities, which current modeling shows are important components of the water budget. However, the study recommended that total pumping of no more than 2,000 AFY be implemented in conjunction with water-level monitoring to track the associated long-term changes in storage.

For the Coldwater MA, an estimated yield of 3,300 AFY was the basis of a 2008 agreement between City of Corona and EVMWD regarding sharing of yield (Corona and EVMWD 2008). This is roughly consistent with pumping and storage change in the current period water budget (**Table 5-4**), but it is smaller than the yield estimates calculated here for the baseline and growth plus climate change scenarios.

The sustainable yield estimates presented here are the result of a comprehensive review of the historical and future water budget components throughout the Basin. The higher future yield values are the result of increased urban recharge as development progresses in the Basin, as required for SGMA.

Sustainable yields calculated from the future scenarios are based on projections far into the future. Slight imbalances in estimated water budgets can result in large cumulative changes in storage, and hence in the calculated yields. By the same token, the long planning horizon provides ample time to adjust water management (recharge and pumping) to maintain basin operation within the sustainable yield if long-term rising or falling trends in cumulative storage in fact occur. In the context of this GSP, sustainable yield estimated from the water budget is contingent on the absence of undesirable results related to water levels, storage, subsidence, water quality, or depletion of interconnected surface water. Quantitative sustainability criteria are presented in Section 6 that define thresholds at which groundwater conditions become undesirable for each of those sustainability indicators. For example, if pumping at the above estimates of sustainable yield caused subsidence or significant impacts on riparian or aquatic habitats, the yield may need to be reduced to avoid those impacts. Accordingly, this sustainable yield value is a broad indicator. It indicates no overdraft based on the water budget, but it must be interpreted through evaluation of undesirable results.



TODD GROUNDWATER

Figure 5-1
Cumulative Departure of Annual Precipitation

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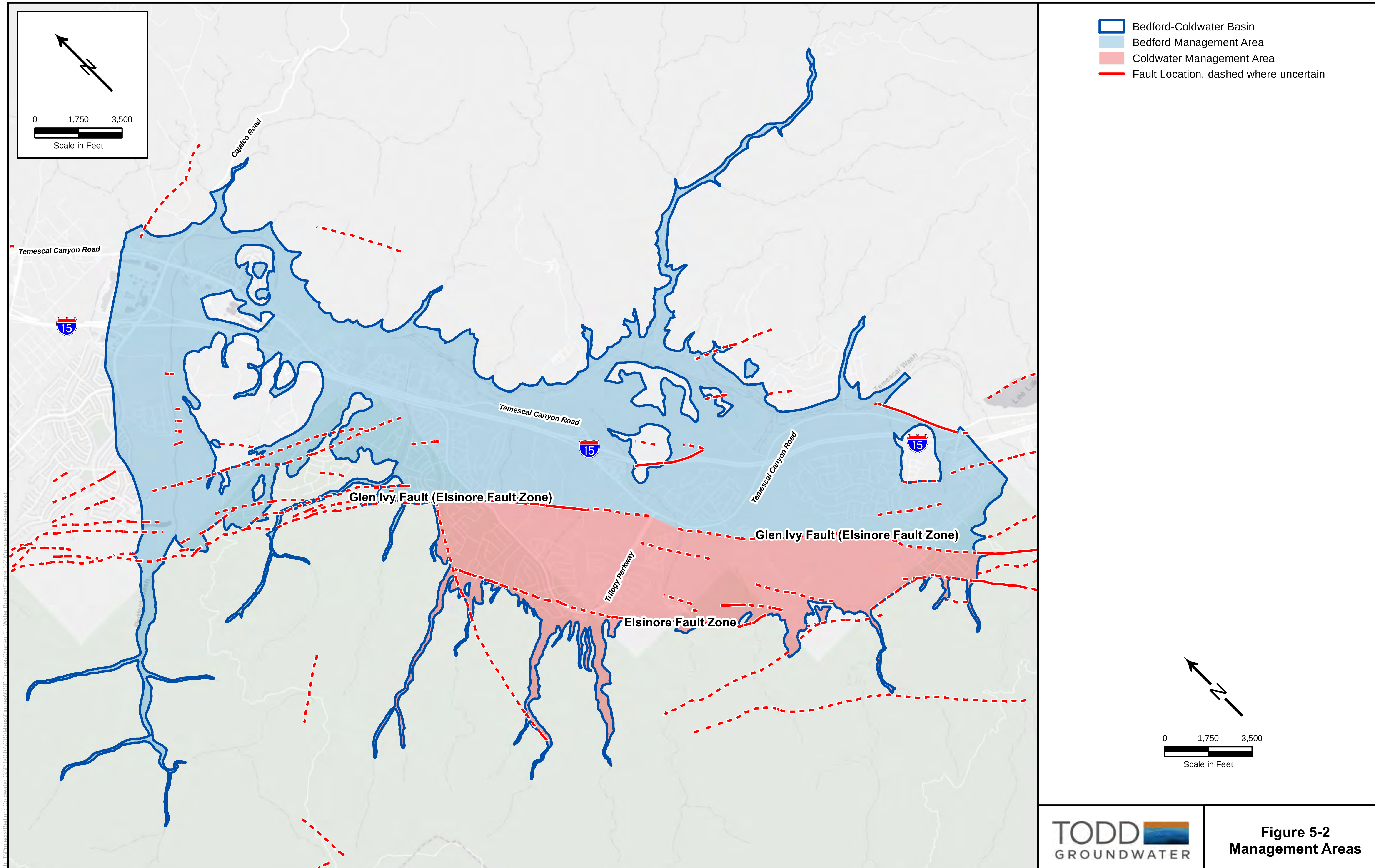
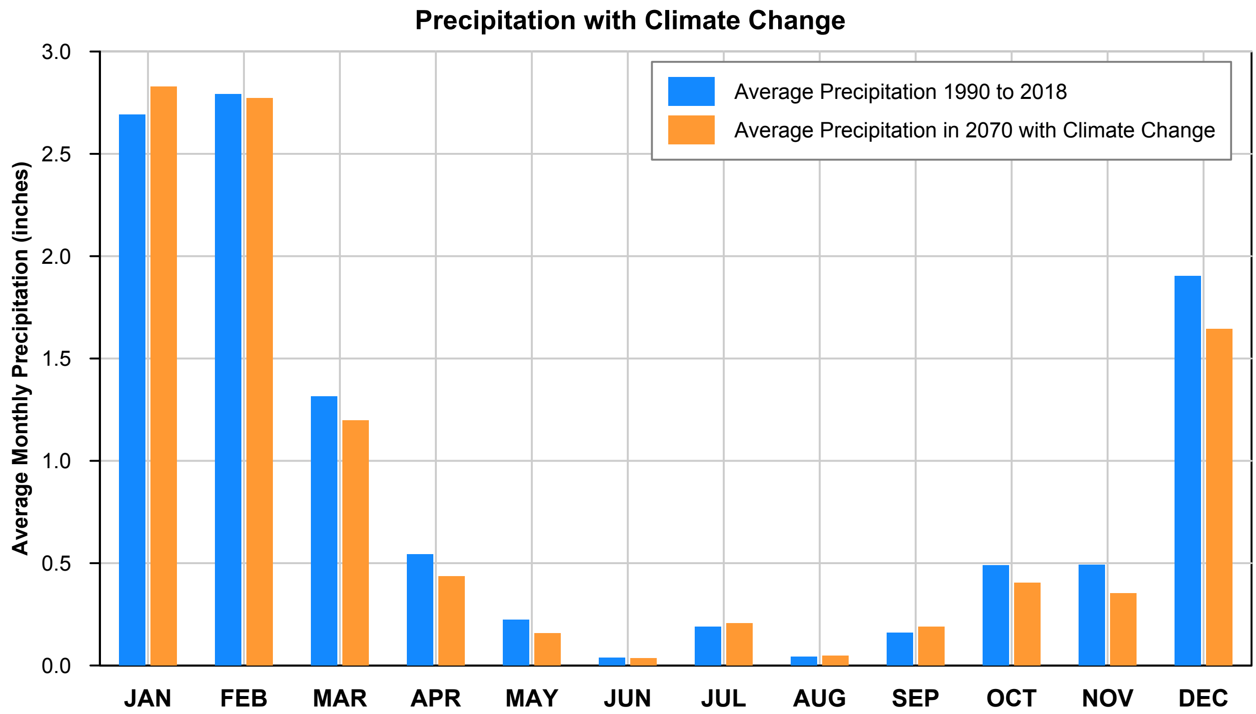
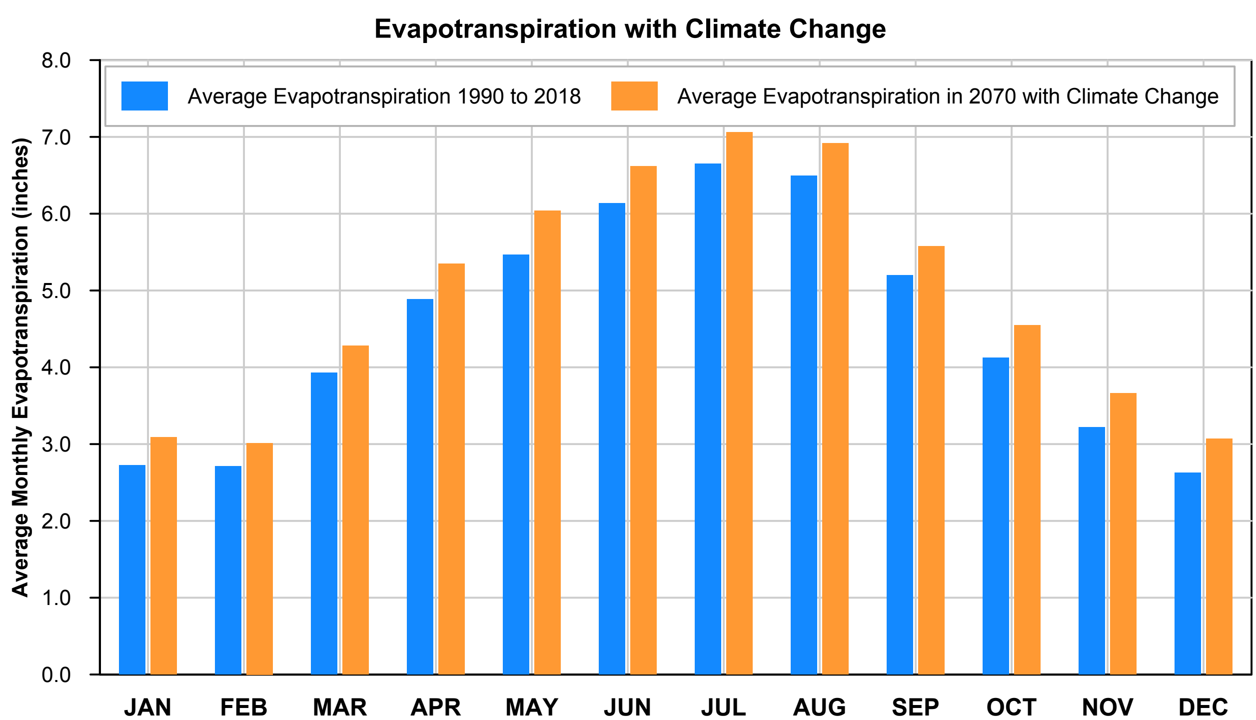


Figure 5-2
Management Areas





Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 5-3 Effect of Climate Change on Precipitation and Evapotranspiration.gpj

TODD GROUNDWATER

Figure 5-3
Effect of Climate Change on Precipitation and Evapotranspiration

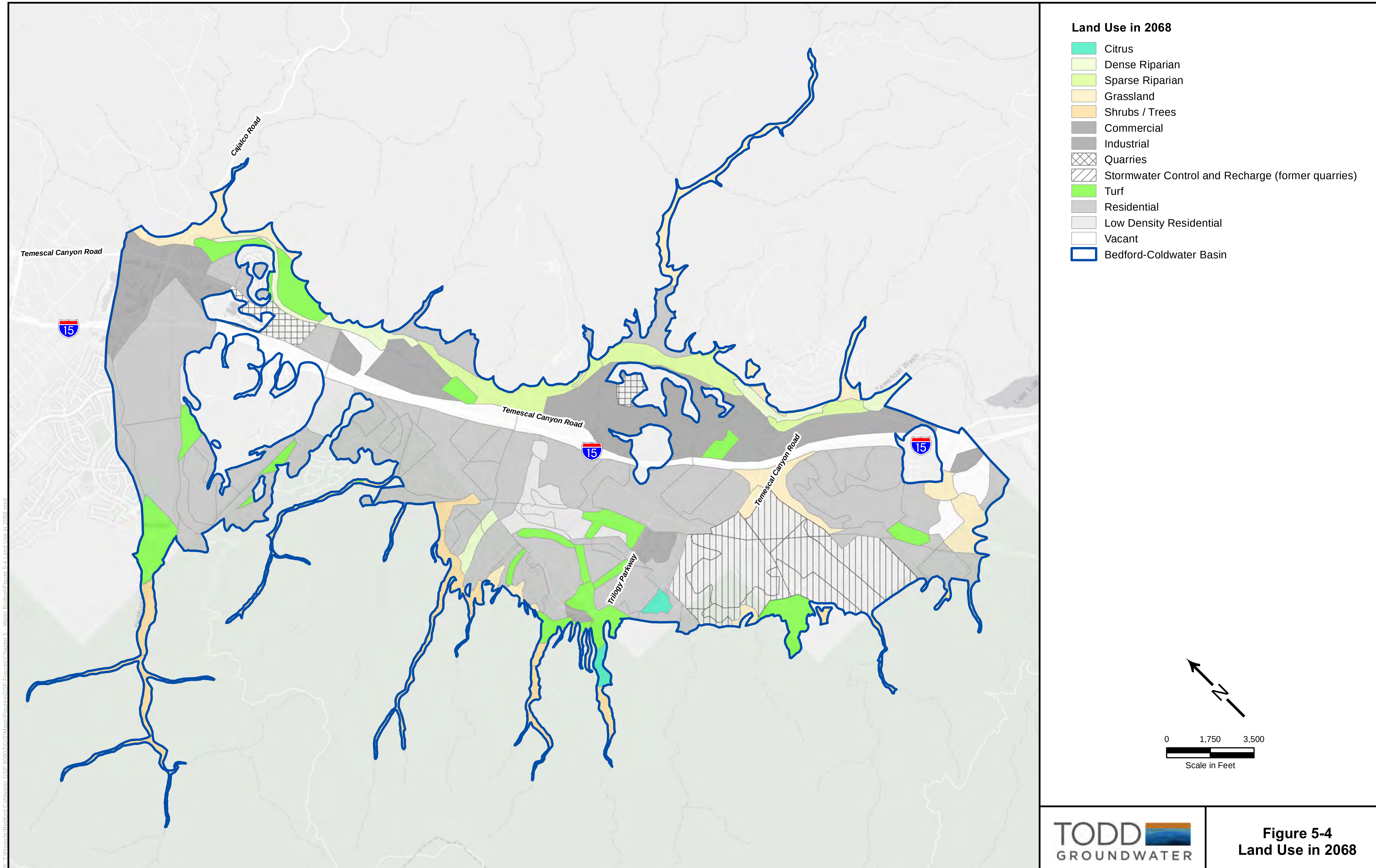
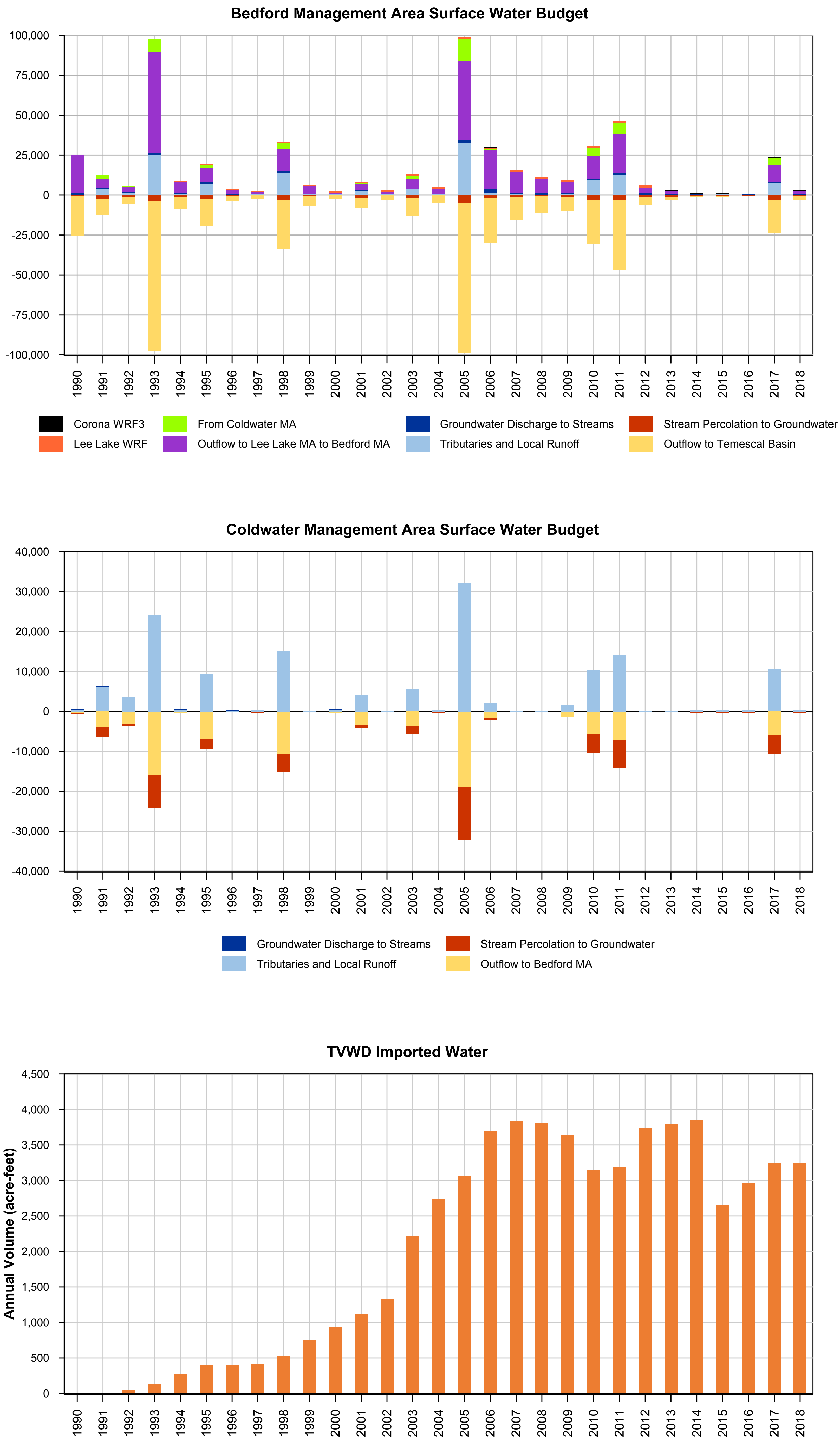
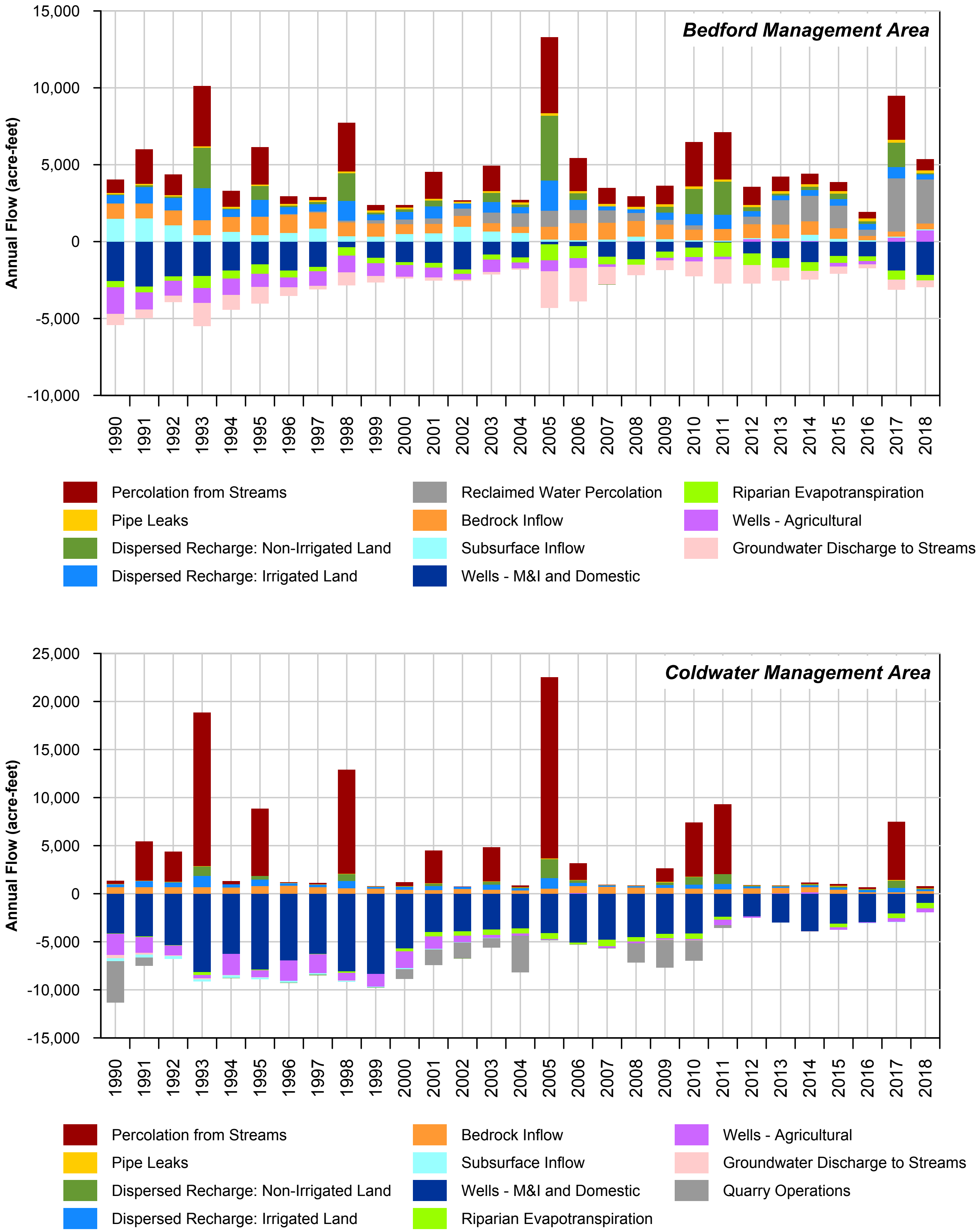


Figure 5-4
Land Use in 2068



TODD GROUNDWATER

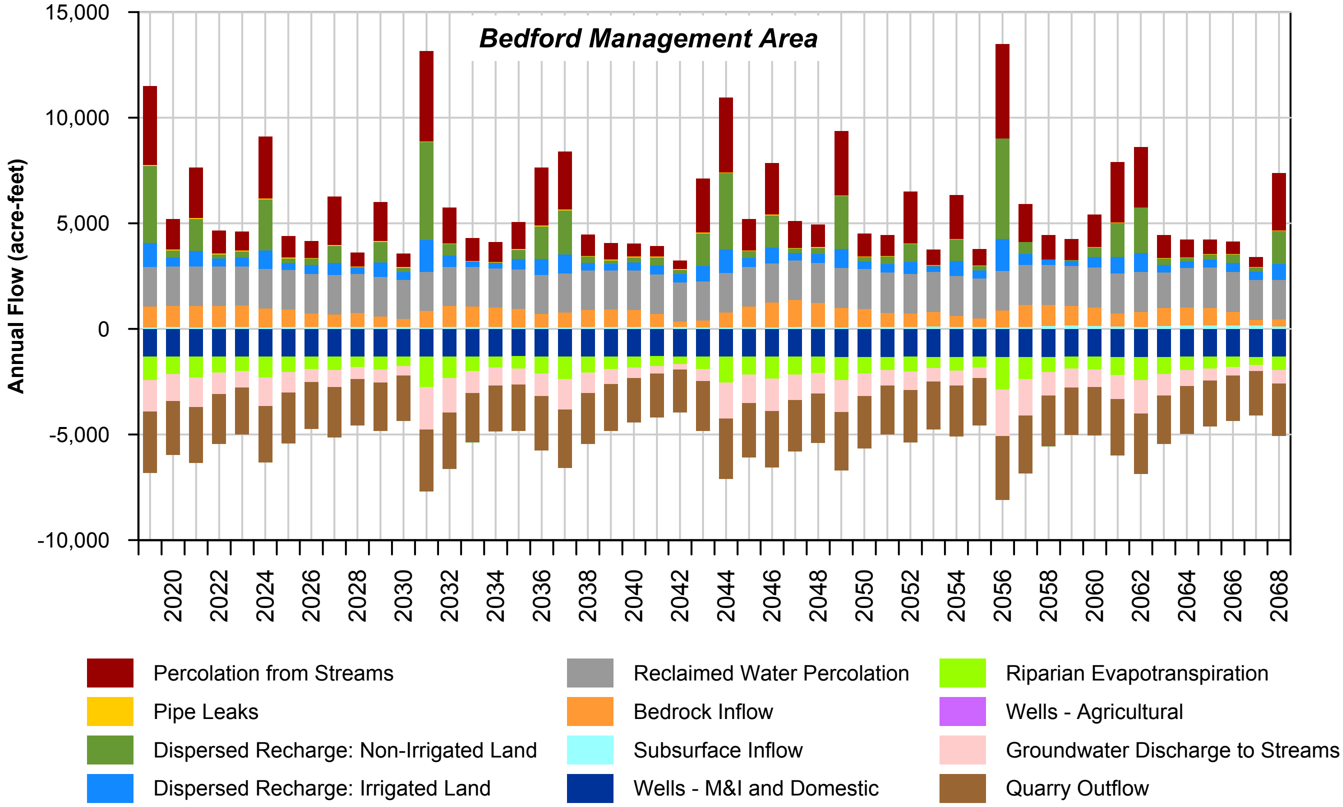
Figure 5-5
Surface Water Budgets
1990 through 2018

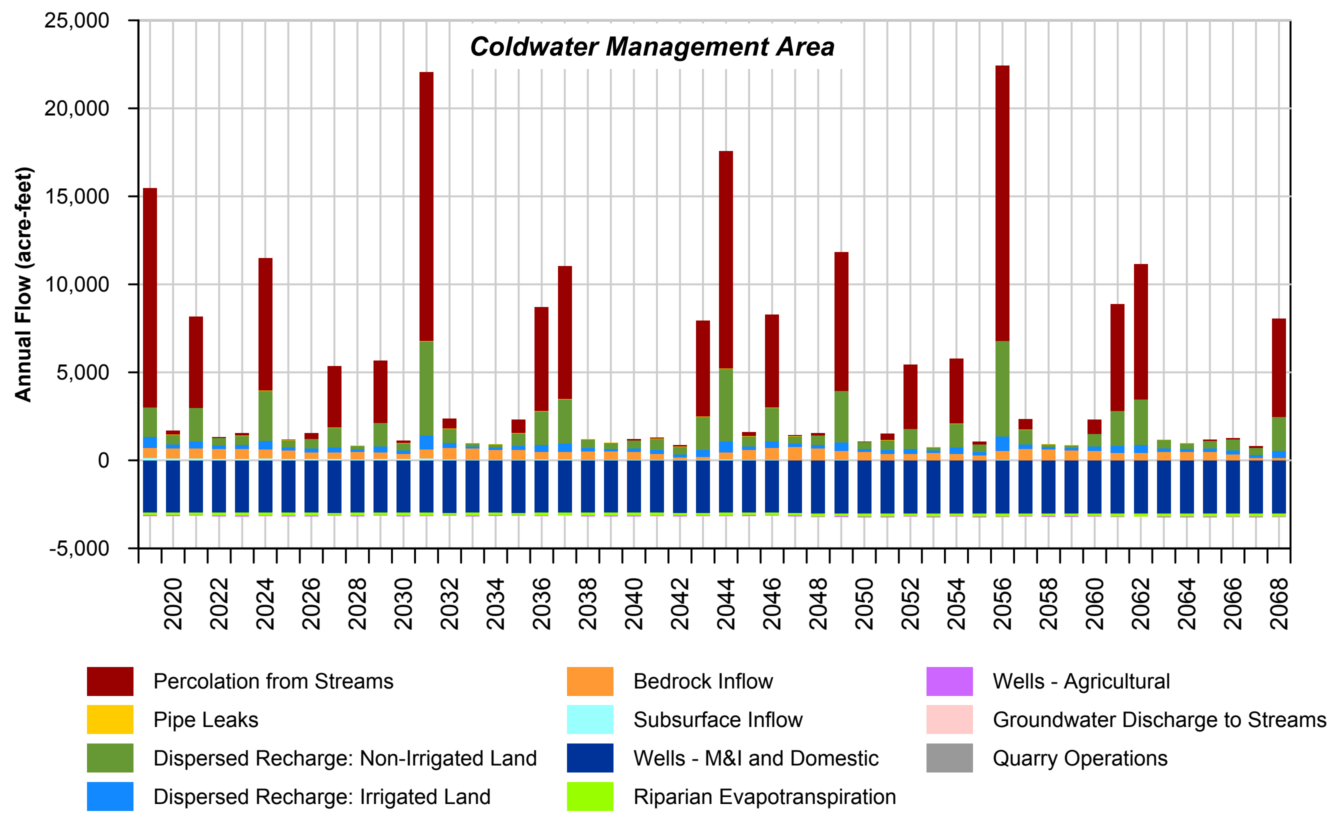


Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 5-6 Annual Groundwater Budgets 1990-2018.gpj

TODD GROUNDWATER

Figure 5-6
Annual Groundwater Budgets, 1990 to 2018

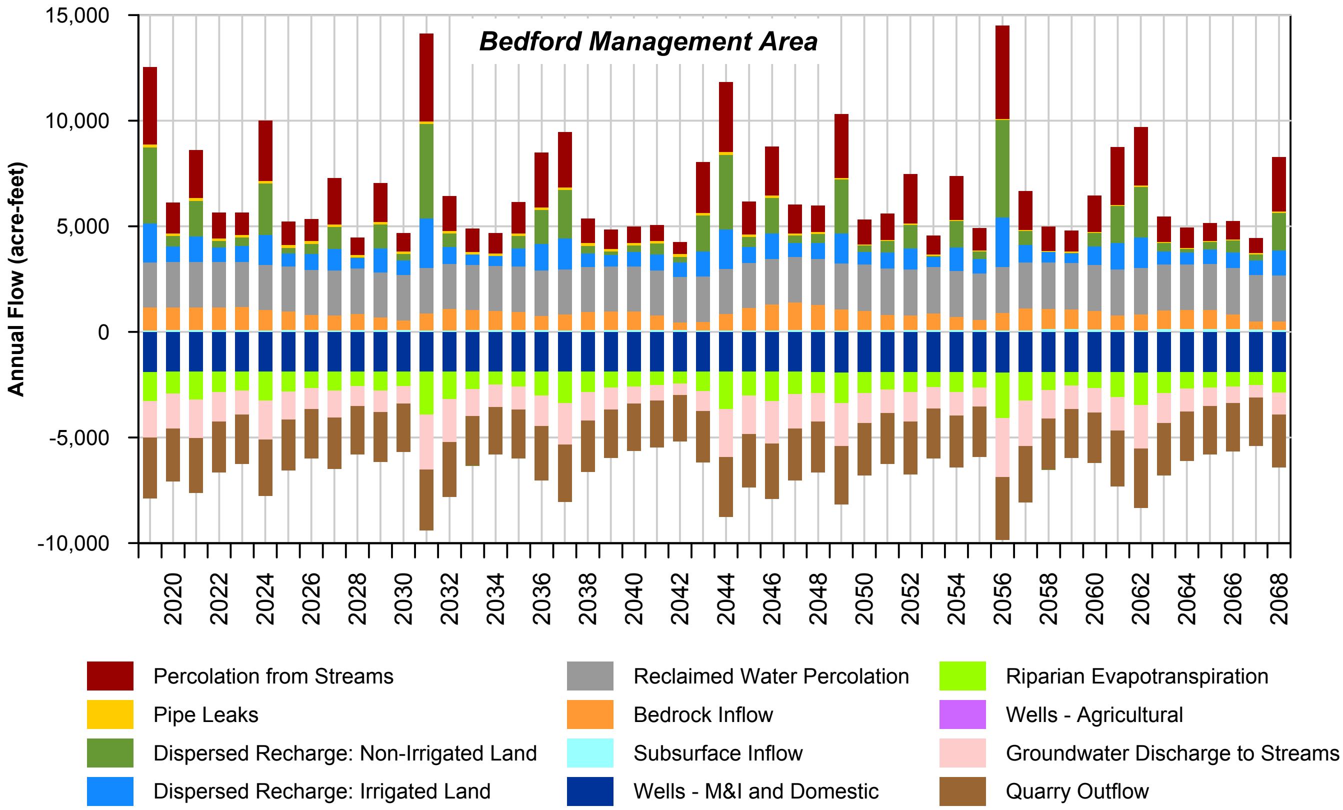


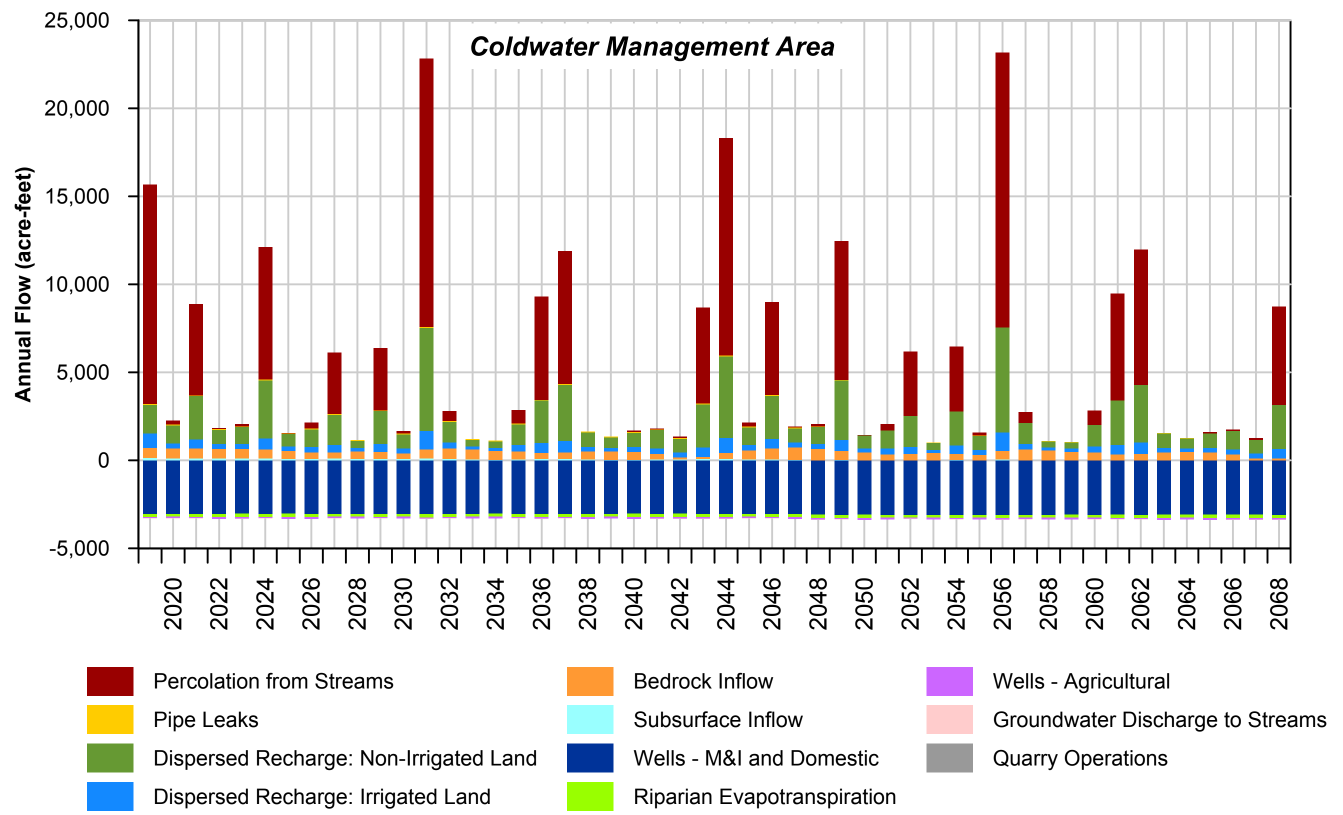


Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 5-7 Annual Groundwater Budgets - Future Baseline.gpj

TODD GROUNDWATER

Figure 5-7
Annual Groundwater Budgets, Baseline





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TODD GROUNDWATER

Figure 5-8
Annual Groundwater Budgets, Growth Plus Climate Change

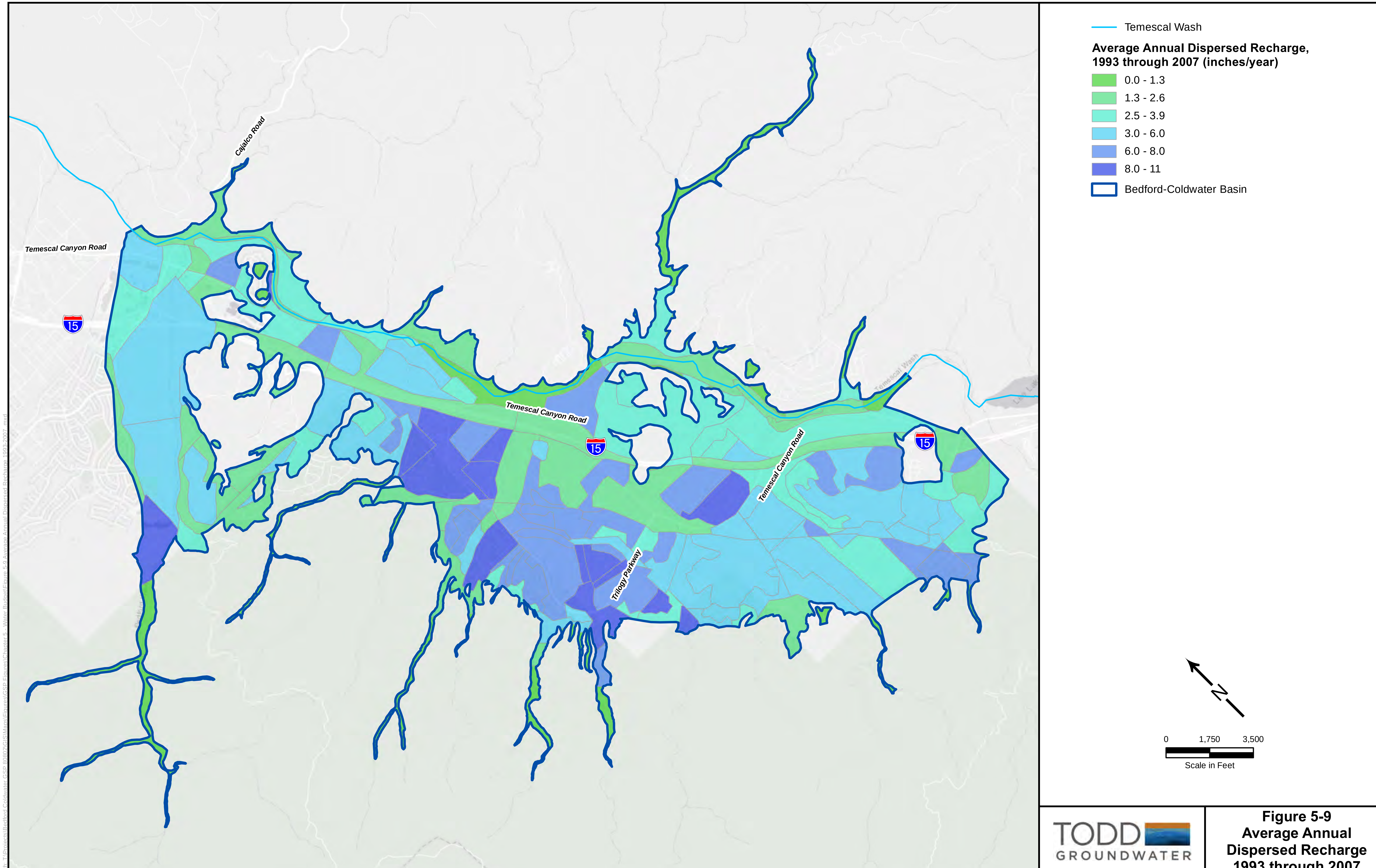
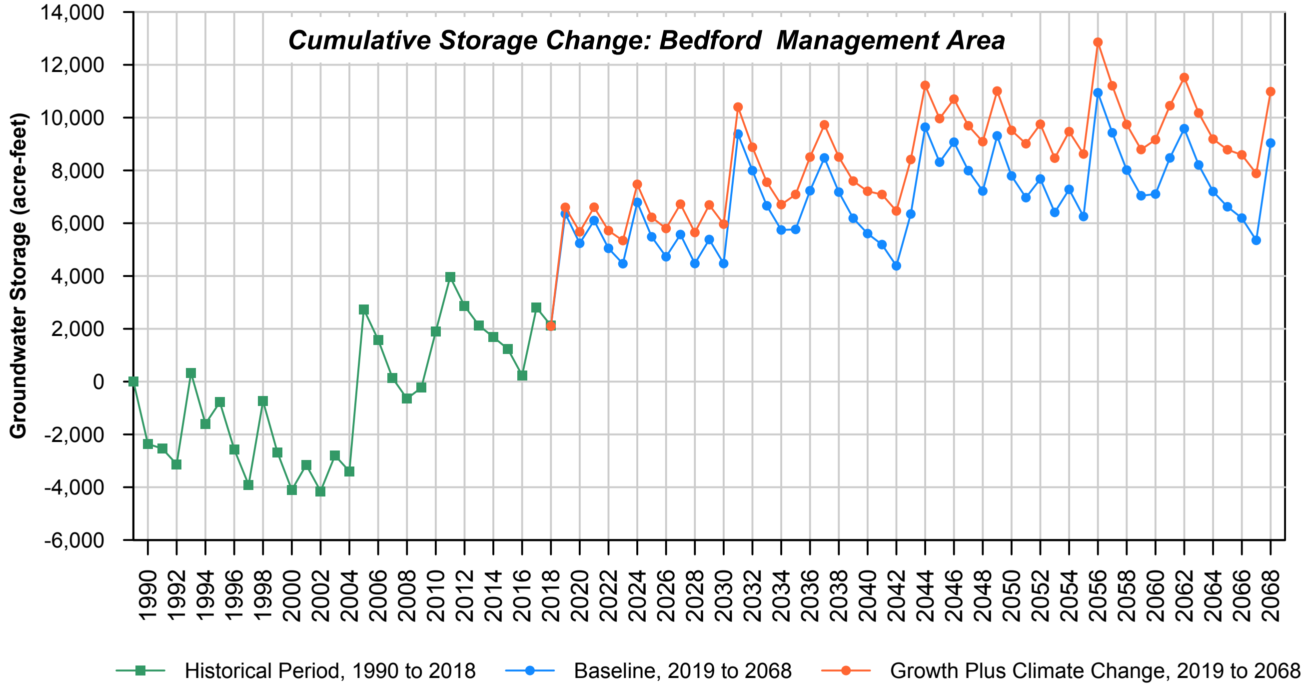
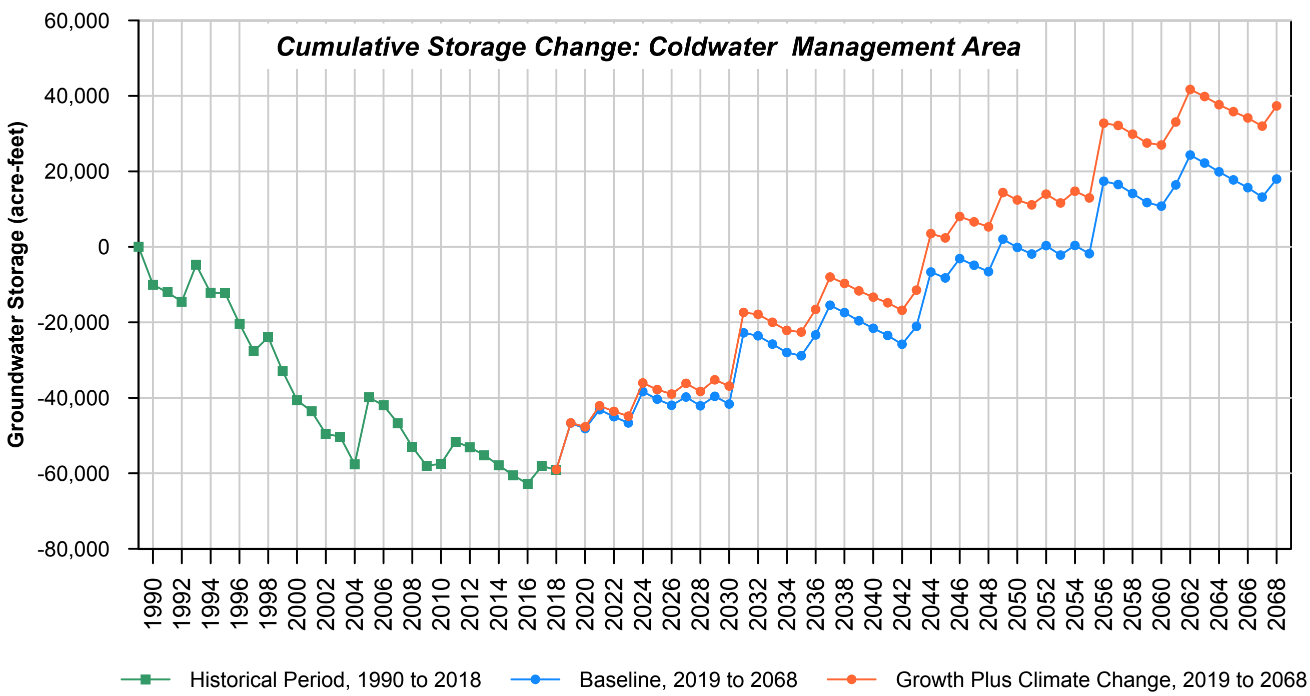


Figure 5-9
Average Annual Dispersed Recharge 1993 through 2007





Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 5-10 Cumulative Storage Changes 1990-2068.gpj

TODD GROUNDWATER

Figure 5-10
Cumulative Storage Changes 1990 to 2068

6. SUSTAINABLE MANAGEMENT CRITERIA

The Sustainable Groundwater Management Act (SGMA) defines sustainable management as the use and management of groundwater in a manner that can be maintained without causing *undesirable results*, which are defined as significant and unreasonable effects caused by groundwater conditions occurring throughout the Bedford-Coldwater Subbasin (Basin), which include:

- Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply.
- Significant and unreasonable reduction of groundwater storage.
- Significant and unreasonable seawater intrusion.
- Significant and unreasonable land subsidence that substantially interferes with surface land uses.
- Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies.
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water.

For these sustainability indicators[5], a Groundwater Sustainability Plan (GSP) must develop quantitative sustainability criteria that allow the Groundwater Sustainability Agency (GSA) to define, measure, and track sustainable management. These criteria include the following:

- Undesirable Result – significant and unreasonable conditions for any of the six sustainability indicators.
- Minimum Threshold (MT[6]) – numeric value used to define undesirable results for each sustainability indicator.
- Measurable Objective (MO) – specific, quantifiable goal to track the performance of sustainable management.

Together, these sustainability criteria provide a framework to define sustainable management and delineate between favorable and unfavorable groundwater conditions. This framework also supports quantitative tracking that identifies problems promptly, allows assessment of management actions, and demonstrates progress in achieving the goal of sustainability.

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[5] If one or more undesirable results can be demonstrated as not present and not likely to occur, a GSA is not required to establish the respective sustainability criteria per GSP Regulations §354.26(d); in the inland Bedford-Coldwater Basin (Basin) seawater intrusion is not present and not likely to occur.

[6] The abbreviations for Minimum Threshold (MT) and Measurable Objective (MO) are provided because these terms are used often; however, the full unabbreviated term is used when helpful for clarity or when included in a quotation.

6.1. SUSTAINABILITY GOAL

The sustainability goal can be described as the mission statement of the GSA for managing the Basin; it embodies the purpose of sustainably managing groundwater resources and reflects the local community's values—economic, social, and environmental. The sustainability goal for the Basin, stated below, was developed through discussion at several GSA meetings.

6.1.1. Description of Sustainability Goal

The goal of the GSA in preparing this GSP is to sustain groundwater resources for the current and future beneficial uses of the Bedford-Coldwater Basin in a manner that is adaptive and responsive to the following objectives:

- Provide a long-term, reliable and efficient groundwater supply for municipal, industrial, and other uses;
- Provide reliable storage for water supply resilience during droughts and shortages;
- Protect groundwater quality;
- Support beneficial uses of interconnected surface waters; and
- Support integrated and cooperative water resource management.

This goal is consistent with SGMA and is based on information from the Plan Area, Hydrogeologic Conceptual Model, Groundwater Conditions, and Water Budget sections that:

- Identify beneficial uses of Basin groundwater and document the roles of local water and land use agencies;
- Describe the local hydrogeologic setting, groundwater quality conditions, groundwater levels and storage, and inflows and outflows of the Basin; and
- Document the ongoing water resource monitoring and conjunctive management of groundwater, local surface water, recycled water and especially imported water sources that help protect groundwater quality and maintain water supply.

6.1.2. Approach to Sustainability Indicators

The approach to assessing the sustainability indicators and setting the sustainability criteria has been based on:

- Review of available information from the Plan Area, Hydrogeologic Conceptual Model, Groundwater Conditions, and Water Budget sections of the GSP.
- Discussions with Bedford-Coldwater stakeholders and local agency representatives, GSA manager meetings, and workshops.

This approach has developed throughout the process and generally began with definition of what an undesirable result is; this initially has been exploratory and qualitative and based on plain-language understanding of what *undesirable* means. Potential minimum thresholds have been explored in terms of when, where, how long, why, under what circumstances, and what beneficial use is adversely affected. This step identified seawater intrusion as not present and not likely to occur.

Beyond a qualitative identification of what is undesirable, the approach to defining sustainability indicators varies among the undesirable results. Several of the undesirable results are directly or indirectly related to groundwater levels, including conditions related to groundwater storage, subsidence, and interconnected surface water. The definition began in terms of groundwater levels in individual wells but has recognized that storage depletion, subsidence, and impacts on connected surface water occur as water levels decline. As a result, the sustainability criteria for those indicators are interrelated across space and time, and are coordinated, consistent, and reasonable based on the available data.

The consideration of the causes and circumstances of undesirable results is an important one in Bedford-Coldwater as multiple agencies rely on this small Basin. Water is produced and used in the Basin by Temescal Valley Water District (TVWD) and produced for use in the Basin and in the neighboring Temescal and Elsinore Basins by the City of Corona (Corona) and Elsinore Valley Municipal Water District (EVMWD), respectively. Cooperative groundwater management between these three major agencies is essential to ensure sustainability.

The intent is to quantify and qualify sustainability criteria such that they guide good management without setting off false alarms or triggering costly, ineffective, or harmful management actions.

6.1.3. Summary of Sustainable Management Criteria

This section documents the six sustainability criteria as relevant to Bedford-Coldwater Basin and as guided by the Sustainability Goal. As documented in this section, the Basin has been and is being managed sustainably relative to all criteria (except seawater intrusion, which does not apply because the Basin is over 20 miles from the ocean). Accordingly, sustainability does not need to be achieved, but it does need to be maintained through the planning and implementation horizon. This will involve continuation and improvement of existing management actions. It also will include improvement and expansion of management actions and monitoring. These improvements are addressed for each sustainability criterion specific subsections.

While the Bedford-Coldwater Basin has been managed sustainably, the following sustainability criteria are defined in this section because potential exists for future undesirable results.

- The Minimum Threshold for defining undesirable results relative to chronic lowering of groundwater levels is defined at each Key Well by operational considerations to maintain water levels at or above current pump intakes or screen bottoms (whichever is higher) in municipal water supply wells. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in two-thirds or more of the currently monitored wells in each Management Area.

- The Minimum Threshold for reduction of groundwater storage for all Management Areas is fulfilled by the minimum threshold for groundwater levels as proxy.
- The Minimum Threshold for land subsidence is defined as a cumulative decline equal to or greater than one foot of decline since 2015, which represents current conditions and the SGMA start date. This is equivalent to a rate of decline equal to or greater than 0.2 feet in any five-year period. The extent of cumulative subsidence across the Basin will be monitored and evaluated using Interferometric Synthetic Aperture Radar (InSAR) data available through the SGMA Data Viewer during the 5-year GSP updates. Subsidence as a result of groundwater elevation decline is closely linked to groundwater levels and it is unlikely that significant inelastic subsidence would occur if groundwater levels remain above their minimum thresholds.
- The Minimum Thresholds for degradation of water quality address nitrate and total dissolved solids (TDS) for the entire Basin.
    - The Nitrate Minimum Threshold (in both Management Areas) is defined as 5-year average concentrations of all monitored wells not exceeding the 10 milligrams per liter (mg/L) drinking water maximum contaminant level (MCL) for Nitrate as Nitrogen.
    - The TDS Minimum Threshold (in both Management Areas) is defined as the 5-year average concentrations not exceeding the 1,000 mg/L secondary MCL for TDS.
- The Minimum Threshold for depletion of interconnected surface water is the amount of depletion associated with the lowest water levels recorded during the 2010 to 2015 drought. Specifically, undesirable results would occur if more than half of monitored wells near Temescal Wash had static water levels lower than 35 feet below the adjacent riparian vegetation ground surface elevation for a period of more than one year.

6.2. CHRONIC LOWERING OF GROUNDWATER LEVELS

Chronic lowering of groundwater levels can indicate significant and unreasonable depletion of supply, causing undesirable results to domestic, agricultural, or municipal groundwater users if continued over the planning and implementation horizon. As a clarification, drought-related groundwater level declines are not considered chronic if groundwater recharge and discharge are managed such that groundwater levels recover fully during non-drought periods.

Declining groundwater levels directly relate to other potential undesirable effects (for example regarding groundwater storage, land subsidence and interconnected surface water); these are described in subsequent criterion specific sections.

Groundwater elevation trends in the Basin are represented by hydrographs documented in Groundwater Conditions Section 4.1. Over time, groundwater elevations have varied in response to precipitation, groundwater pumping, and groundwater use trends; however, the

Basin does not display widespread chronic groundwater level declines and is not characterized by overdraft.

6.2.1. Description of Undesirable Results

As groundwater levels decline in a well, a sequence of increasingly severe undesirable results will occur. These include an increase in pumping costs and a decrease in pump output. With further declines, the pump may break suction, which means that the water level in the well has dropped to the level of the pump intake. This can be remedied by lowering the pump inside the well, which can cost thousands of dollars. Chronically declining water levels will eventually drop below the top of the well screen. This exposes the screen to air, which can produce two adverse effects. Water entering the well at the top of the screen will cascade down the inside of the well, and entraining air may result in cavitation damage to the pump. The other potential adverse effect of exposure to air is accelerated corrosion of the well screen. Over time, corrosion creates a risk of well screen collapse, which often renders the well unusable. If water levels decline by more than about half of the total thickness of the aquifer (or total length of well screen), water might not be able to flow into the well at the desired rate regardless of the capacity or depth setting of the pump. This might occur where the thickness of basin fill materials is relatively thin. While describing a progression of potential adverse effects, at some point the well no longer fulfills its water supply purpose and is deemed to have "gone dry." For the purposes of this discussion, a well going dry means that the entire screen length (to the bottom of the deepest screen) is unsaturated.

For purposes of setting a Minimum Threshold, undesirable results are defined as a well going dry. This appears to be a low standard and not protective of private wells but there are very few private wells in the Basin. The rationale is summarized as follows with more explanation in the following sections:

- There are very few active private wells in the Basin, as residential users are connected to municipal water supplies.
- Known private wells are for non-potable uses and are of similar depths and construction to the monitored municipal supply wells. No private wells have been reported to have water shortages in the California Department of Water Resources (DWR) led *Household Water Supply Shortage Reporting System* (DWR 2021).
- Responsibility for potential undesirable results to shallow wells is shared between a GSA and a well owner; there is a reasonable expectation that a well owner would construct, maintain, and operate the well to provide its expected yield over the well's life span, including droughts.

6.2.2. Potential Causes of Undesirable Results

For Bedford-Coldwater Basin, the primary potential cause of declining groundwater levels and associated undesirable results would be increased groundwater production and/or reduced inflows (recharge). Given that the Bedford-Coldwater Basin is not characterized by basin-wide chronic groundwater level declines, then the undesirable results of a well losing yield, having damage, or “going dry” represent a more complex interplay of causes and shared responsibility.

Some of the potential causes are within the Bedford-Coldwater Groundwater Sustainability Agency (BCGSA) responsibility; most notably, a GSA is responsible for groundwater basin management without causing undesirable results such as chronic groundwater level declines. SGMA also requires that a GSA address significant and unreasonable effects caused by groundwater conditions *throughout the basin.* This indicates that a GSA is not solely responsible for local or well-specific problems and furthermore that responsibility is shared with a well owner. A reasonable expectation exists that a well owner would construct, maintain, and operate the well to provide its expected yield over the well’s life span, including droughts, and with some anticipation that neighbors also might construct wells (consistent with land use and well permitting policies).

6.2.3. Definition of Undesirable Results

As context, the Bedford-Coldwater Sustainability Goal has the objective to provide a long-term, reliable, and efficient groundwater supply for municipal, industrial, and other uses.

In that light, the definition of undesirable results would be the chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. This is defined by groundwater conditions occurring throughout the Basin, with a focus on operation of wells. This definition also recognizes that chronic lowering of groundwater levels could affect groundwater flow to or from the hydraulically connected Temescal and Elsinore Basins, and thereby potentially affect their ability to maintain sustainability.

As documented in Groundwater Conditions Section 4.1, analysis of hydrographs reveals that Bedford-Coldwater is not characterized by basin-wide chronic groundwater level declines. While affected at times by drought, groundwater levels in broad areas of the Basin have been maintained at relatively stable levels. Moreover, the Bedford-Coldwater area has not been marked by reports of significant impacts to shallow supply wells as a result of water level declines. In the absence of reported well problems associated with declining groundwater levels, it can be concluded that undesirable results for the chronic lowering of water levels are not occurring in the Bedford-Coldwater and that the Basin is managed sustainably relative to groundwater levels.

6.2.4. Potential Effects on Beneficial Uses and Users

Groundwater is a source of supply in the Basin and supplies water for municipal, industrial, and other beneficial uses. Groundwater has been and is being used for the range of beneficial uses, even during drought, and with reasonable operation and maintenance by well owners.

6.2.5. Sustainable Management Criteria for Groundwater Levels

The general approach to defining sustainability criteria (minimum thresholds and measurable objectives) for groundwater levels has involved selection of representative monitoring wells, review of groundwater level data, and review of supply well location/construction information to gage potential undesirable effects on wells. Specifically, this has included evaluating historical water levels and well operations in monitored wells. This approach is founded on the idea that undesirable results are the reduction of available supply in these monitored wells.

6.2.5.1. Selection of MT by Well

The approach includes selection of existing wells currently monitored in the Basin. Sustainability criteria would be defined for each of these wells, and each would be monitored for groundwater levels with respect to MTs and MOs. These wells are primarily production wells, which is not optimal for monitoring because pumping lowers water levels resulting in monitoring that is sometimes not representative of aquifer conditions. On the other hand, they are generally representative of production wells throughout the Basin.

Groundwater level data and hydrographs of each monitored well have been reviewed along with well construction and pumping equipment details in each monitored well. These data were used to review wells that the BCGSA currently monitors to confirm that they are suitable for use as Key Wells for defining MTs and MOs. This process showed that all the wells that the BCGSA agencies currently monitor are appropriate for use as Key Wells and monitoring of these wells will continue in the future. **Table 6-1** shows information on the Key Wells in the Basin. The table also shows well construction and pump intake information along with maximum historical depth to water and well-specific MT. The locations of the Key Wells are shown on **Figure 6-1**.

Table 6-1. Minimum Thresholds for Groundwater Levels

Local Well Name	Agency	Management Area	Monitoring Frequency	Total Well Depth (feet)	Screen Interval Depths (feet)	Pump Intake Depth (feet)	Historical Maximum Depth to Water (feet)	Date of Maximum Depth to Water	Threshold Description	Threshold Depth to Water (feet)
Corona Well 20	Corona	Coldwater	Static - Monthly	660	200 to 580	460	375.10	1/17/2017	Pump intake	460
Corona Well 21	Corona	Coldwater	Static - Monthly	660	200 to 580	460	398.00	12/1/2001	Pump intake	460
Corona Well 3	Corona	Coldwater	Static - Monthly	543	100 to 530	479	392.00	12/16/2016	Pump intake	479
Corona Non-Potable Well 1	Corona	Bedford	Continuous (SCADA)	Unkown	Unkown	Unkown	55.60	11/13/2016	Nearby pump intake	80
Corona Non-Potable Well 2	Corona	Bedford	Continuous (SCADA)	Unkown	Unkown	Unkown	55.40	11/13/2016	Nearby pump intake	80
EVMWD Flagler 2A Well	EVMWD	Bedford	Continuous (SCADA)	105	51 to 92	80	48.00	10/18/2019	Pump intake	80
EVMWD Flagler 3A Well	EVMWD	Bedford	Continuous (SCADA)	100	51 to 90	80	57.00	10/18/2019	Pump intake	80
Corona & EVMWD Trilogy	EVMWD	Coldwater	Quarterly	579	250 to 360 and 390 to 450	No pump	359.30	10/12/2016	Ten feet above bottom of screen	440
EVMWD Station 71	EVMWD	Bedford	Quarterly	600	239 to 588	507	499.92	7/21/2017	Pump intake	507
EVMWD Mayhew Well 2	EVMWD	Coldwater	Quarterly	740	300 to 730	507	440.99	11/28/2017	Pump intake	507
TVWD Well 1 (Old well)	TVWD	Bedford	Continuous (SCADA)	100	40 to 80	No pump	42.50	11/1/2016	Ten feet above bottom of screen	70
TVWD Well 1A	TVWD	Bedford	Continuous (SCADA)	100	40 to 80	85	53.40	11/15/2016	Ten feet above bottom of screen	70
TVWD Well 4	TVWD	Bedford	Continuous (SCADA)	100	40 to 80	85	46.80	10/7/2015	Ten feet above bottom of screen	70
TVWD TP-1	TVWD	Bedford	Continuous (SCADA)	103	39 to 99	85	Unknown	Unknown	Pump intake	85
TVWD TP-2	TVWD	Bedford	Continuous (SCADA)	90	30 to 85	85	Unknown	Unknown	Ten feet above bottom of screen	75
TVWD Foster	TVWD	Bedford	Continuous (SCADA)	93	38 to 88	84	Unknown	Unknown	Ten feet above bottom of screen	78
TVWD New Sump	TVWD	Bedford	Continuous (SCADA)	74	Unkown	66	101.67	8/1/1994	Pump intake	66

6.2.6. Minimum Thresholds

According to GSP Regulations Section 354.28(c)(1), the minimum threshold for chronic lowering of groundwater levels must be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. MTs for chronic lowering of groundwater levels are to be supported by information on the rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the Basin. However, as documented in the Groundwater Conditions Section 4.1.3, groundwater levels are not chronically declining in Bedford-Coldwater. While groundwater levels decline in dry and critically-dry years, they have recovered in normal, above normal, and wet years. Groundwater levels in some wells were at historical lows after the recent drought ending in 2016 but are recovering.

Currently, none of the wells have groundwater levels below their respective MTs and no undesirable results are known to have occurred in the past. Nonetheless, MTs have been developed because the potential exists for chronic lowering of groundwater levels in the future.

Using available recent and reliable information on the construction of existing supply wells, the MT levels shown in **Table 6-1** are protective of most supply wells. Based on historical lows, the MTs account for historical groundwater level variations, and consideration has been given to supporting Basin management flexibility, for example to avoid setting off false alarms or triggering costly, ineffective, or harmful management actions.

The MTs shown in **Table 6-1** were developed making use of available data. However, uncertainties exist as summarized below:

- The geographic distribution of wells in the groundwater level monitoring program is uneven.
- Information on vertical groundwater gradients is lacking and groundwater levels in shallow wells may not be represented adequately by relatively deep wells.
- The specific location, status, and construction of most existing private wells is not known, or the information is not readily available (in databases).

These uncertainties have been recognized and are being addressed in this GSP as follows:

- Mapping and prioritization of geographic gaps in the monitoring program.
- Installation of two new dedicated monitoring wells sited and designed to support the groundwater level monitoring program (among other objectives) and to become Key Wells.
- Identification and mapping of existing active private production wells within the Basin, as described in Section 8 Projects and Management Actions.

The benefits of these efforts will accrue over the next few years and will support review and update of the MTs in the 5-Year GSP Update in 2027.

6.2.6.1. Minimum Thresholds and Criteria for Undesirable Results

Undesirable results are based on exceedances of MT levels and must be defined not only in terms of how they occur (as described in Section 6.2.2 Potential Causes of Undesirable Results), but also when and where. By definition, undesirable results are not just drought-related but chronic and are not just local but basin-wide.

The distinction between drought and chronic declines may not be clear when declines are occurring, particularly during drought when it is not known whether subsequent years will bring recovery. Moreover, effects of declining levels on individual well owners may be real problems, whether or not they represent basin-wide sustainability issues.

The BCGSA will perform quarterly or more frequent groundwater level monitoring. Accordingly, groundwater level monitoring and annual reporting provides an early warning system that allows response by the BCGSA and local groundwater users. From this perspective, two consecutive exceedances in each of two consecutive years is regarded as indicating when an undesirable result is occurring. The exceedances would be measured at a Key Well as part of the regular quarterly monitoring program. It should be noted that GSA responses do not have to wait for two years and may involve a staged response as in urban water shortage contingency plans.

While undesirable results relate to groundwater conditions throughout the Basin, the Basin has been organized into two management areas (MAs). As discussed in Section 5.4, this reflects the fact that the Basin is separated by a fault zone, limiting (but not eliminating) flow between the two MAs. Groundwater level MTs will be evaluated separately for each MA, because the groundwater histories are distinct, albeit linked. As a result, undesirable results could occur in one MA and not the other. Accordingly, undesirable results are indicated to be occurring when two-thirds or more of the currently monitored wells in the MA have had two consecutive exceedances in each of two consecutive years.

To summarize for the Bedford-Coldwater Basin:

> The **Minimum Threshold** for defining undesirable results relative to chronic lowering of groundwater levels is defined at each Key Well by operational considerations to maintain water levels at or above current pump intakes or screen bottoms (whichever is higher) in municipal water supply wells. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in two-thirds or more of the currently monitored wells in each Management Area.

6.2.6.2. Relationship of Minimum Threshold to Other Sustainability Indicators

The establishment of MTs also needs to consider potential effects on other sustainability indicators. These indicators are discussed later in this section; the following are brief discussions.

- **Groundwater Storage**. The MTs for groundwater levels are protective of groundwater storage. These MTs are defined in terms of operational considerations for wells used to support beneficial uses in the Basin. The major concern expressed in the Sustainability Goal is to have reliable storage for drought conditions. As the water level MTs support maintenance of production capacity in wells, they also support maintenance of reliable storage.

- **Seawater Intrusion.** There is no possibility of seawater intrusion in the Bedford-Coldwater Basin as it is more than 20 miles from the ocean. Accordingly, there is no seawater intrusion minimum threshold and no relationship with other minimum thresholds.
- **Subsidence.** Subsidence is linked to groundwater levels. It is unlikely that significant inelastic subsidence would occur if groundwater levels remain within the operational range of water levels, which have been used to define groundwater level MTs. Accordingly, the minimum threshold for groundwater levels is consistent with and supportive of the objective to prevent subsidence undesirable results.
- **Water Quality.** General relationships are recognized, for example that contaminants may be mobilized by changing groundwater levels or flow patterns. Maintenance of groundwater levels within historical operational ranges would minimize any effects on maintenance of water quality at or above minimum thresholds. The groundwater quality issues in Bedford-Coldwater Basin are associated primarily with salt and nutrient loading and not likely to be affected by groundwater levels or flow within operational ranges.
- **Interconnected Surface Water.** The set of monitoring wells used to evaluate interconnected surface water overlaps with the set of wells used for the groundwater levels minimum threshold. In general, the MTs for interconnected surface water are similar to or higher than those for groundwater levels; the higher MTs would be controlling.

6.2.6.3. Effect of Minimum Threshold on Sustainability in Adjacent Areas

The Bedford-Coldwater Basin is adjacent to the Temescal Basin and the Elsinore Basin. Groundwater flow directions are from the Elsinore Basin through Bedford MA to the Temescal Basin with some drainage into the Temescal Wash. The Bedford-Coldwater groundwater level MTs would support maintenance of groundwater levels above their respective MTs in Bedford MA. This in turn will support maintenance of groundwater levels in the Temescal Basin.

6.2.6.4. Effect of Minimum Threshold on Beneficial Uses and Users

Groundwater is the major source of supply in the GSP Area and supplies wells for municipal, industrial, and other beneficial uses and users. The MTs are based generally on well operations, which recognizes that groundwater has been and is being used reasonably for the range of beneficial uses even during drought, and with reasonable operation and maintenance by well owners. In addition, there are few private well owners in the Basin and the municipal production wells would likely be the first wells impacted by lower water levels. The MTs quantify undesirable results as involving two-thirds of wells in a MA with two consecutive exceedances in each of two consecutive years, which provides early warning of declining groundwater levels.

6.2.6.5. Relationship of Minimum Threshold to Regulatory Standards

No federal, state or local standards exist for groundwater levels.

6.2.6.6. How Management Areas Can Operate without Causing Undesirable Results

The establishment of MTs has been consistently conceived and applied across both Management Areas. MTs are based on well operations, which vary from well to well representing local conditions that do not necessarily occur at the same time across the MAs. Maintenance of water levels within the operational range in wells is not anticipated to cause undesirable results between the two MAs.

6.2.6.7. How the Minimum Threshold will be Monitored

Monitoring for the groundwater levels MT will be conducted as part of the BCGSA groundwater level monitoring program, data and analytical results will be presented in the Annual GSP Reports. The BCGSA monitoring program includes wells monitored by Corona, EVMWD, and TVWD.

6.2.7. Measurable Objectives

Measurable Objectives are defined herein as an operating range of groundwater levels, allowing reasonable fluctuations with changing hydrologic and surface water supply conditions and with conjunctive management of imported water and groundwater. The groundwater level MTs represent the bottom of the operating range and are protective of groundwater users. The top of the operating range is generally where the water table approaches the soil zone and ground surface, except where groundwater and surface water are interconnected or groundwater dependent ecosystems exist. Section 6.7 addresses these areas and potential undesirable results with Depletions of Interconnected Surface Water. With these important exceptions, the top of the operating range is below the soil zone, thereby minimizing potential agricultural drainage problems.

> The **Measurable Objective** is to maintain groundwater levels above the historical maximum depth to groundwater, and to maintain groundwater levels within the operating range as defined in this section.

Groundwater conditions with respect to chronic groundwater level declines are already sustainable. Therefore, no interim milestones are needed to achieve sustainability by 2042.

6.2.7.1. Discussion of Monitoring and Management Measures to be Implemented

Data gaps and sources uncertainties have been identified in this section, including the lack of reliable and accessible information on active private well pumping and construction.

Management actions to maintain groundwater levels have been ongoing and effective for decades. These actions (consistent with the Sustainability Goal objective to support integrated and cooperative water resource management) have included acquiring imported water for direct use, providing recycled water for irrigation, and other conjunctive use operations. The BCGSA will also implement management actions to inventory existing active private wells. This will include identification of locations and construction information for active wells throughout the Basin to support refinement of the groundwater level MTs and MOs in the 5-year GSP update.

Monitoring improvements are discussed in Section 7, including results of the Dedicated Monitoring Well Program initiated in June 2020.

6.3. REDUCTION OF GROUNDWATER STORAGE

Groundwater storage is the volume of water in the Basin and provides a reserve for droughts or surface water supply shortages. The MT for reduction of groundwater storage is the volume of groundwater that can be withdrawn from a Basin or MA without leading to undesirable results. Undesirable results would involve insufficient stored groundwater to sustain beneficial uses throughout drought or water supply shortage. The storage criteria are closely linked to groundwater levels. The sustainability indicator for groundwater storage addresses the ability of the groundwater Basin to support existing and planned beneficial uses of groundwater, even during drought and surface water supply shortage.

For the each of the two MAs of the Bedford-Coldwater Basin, the water budget has been calculated using the numerical model, as described in Water Budget Section 5. In brief, this has included analyses of the cumulative change in storage for each of the two MAs for the historical and current period, 1990 through 2018, and for simulated future conditions (see **Figures 5-5** and **5-6**). The water budget analyses have shown the dynamic effects of drought and changes in groundwater use and indicate that groundwater storage in the Basin has been sustainably managed relative to storage. The water budget inflow and outflows have been balanced over the long term. Furthermore, as indicated in Section 6.2, none of the water supply wells have been reported as going dry in the Basin during the historical period of record.

6.3.1. Description of Undesirable Results

Given that Bedford-Coldwater Basin has not experienced any impacts to wells related to groundwater storage, the undesirable result associated would be an insufficient supply to support beneficial uses during droughts. Storage is related to groundwater levels. Thus, undesirable results associated with storage would likely be accompanied by one or more undesirable results associated with groundwater levels, including reduced well yields, subsidence, and depletion of interconnected surface water.

6.3.2. Potential Causes of Undesirable Results

For groundwater storage in the Basin, the basic cause of undesirable results would be an imbalance of the water budget, such that outflows exceed inflows resulting in reduction of groundwater storage. This imbalance could be caused in turn by reduced surface water supplies and associated groundwater recharge. Such reduction could potentially include the following conditions: 1) increased pumping due to disruption of imported water, 2) reduced percolation from Temescal Wash, 3) reduced natural recharge due to increased impervious area (development), or 4) increased pumping due to reduced recycled/non potable discharge and use. Undesirable results also could occur because of changes in land use causing increased demand for groundwater; this would be most problematic in portions of the Basin without access to other water supplies.

6.3.3. Definition of Undesirable Results

Undesirable results are defined with the understanding that the objective of groundwater management is to provide reliable storage for water supply resilience during droughts and shortages. Accordingly, the definition of potential undesirable results for storage reduction includes consideration of how much storage has been used historically (i.e., operating storage) and how much stored groundwater reserve is needed to withstand droughts.

In considering conceptual operating storage or groundwater reserves, it is important to bear in mind that these are not the total amount of groundwater that could potentially be extracted from the Basin. Most wells are in the range of 75 to 700 feet deep.

The depth of the Basin ranges from less than 40 feet in some areas to more than 800 feet in others (see **Figure 3-9**). Groundwater wells used for water supply are generally located in the deeper portions of the Basin. Additional groundwater storage could be utilized, with the foremost assumption that withdrawals and reduction are followed by commensurate recharge and recovery. This could occur as part of enhanced conjunctive use programs.

6.3.4. Potential Effects on Beneficial Uses and Users

Groundwater is a source of water supply in the GSP Area and supplies wells for municipal, industrial, and other beneficial uses. Reduction of groundwater storage would reduce access to that supply with adverse effects on the community, economy, and environmental setting of the Temescal Valley. However, groundwater has been and is being used for the beneficial uses, even during drought.

6.3.5. Sustainable Management Criteria for Groundwater Storage

The general approach to defining sustainability criteria for groundwater storage has involved review of historical cumulative change in storage and expected future storage declines during droughts. Review of historical change in storage is useful to estimate about how much storage has been used in each Management Area, effectively defining an *operating storage*. Similarly, the approach focuses on the beneficial uses of the Basin and acknowledges much of the pumping occurs in larger municipal wells with dynamic operations. Sustainability criteria for groundwater levels also take into account historical ranges and the management of dynamic operation of municipal wells.

6.3.5.1. Description of Historical Cumulative Change in Storage: 1990 through 2018

The cumulative change in storage by management area for historical and current conditions (1990 through 2018) as simulated by the numerical model is discussed and shown in tables and figures in Section 5. Observations about the historical operating storage for each of the Management Areas are as follows:

Bedford Management Area. The average annual change in groundwater storage was stable over the model period, 1990 through 2018, with an average increase in storage of 73 acre-feet per year (AFY). This increase in storage is due to decreased pumping from 2005 to the end 2019, when pumping in the MA averaged about 1,000 AFY. The change in storage during this same period increased on average about 400 AFY. For the early portion of the model (1990 through 2004), groundwater pumping was approximately 2,500 AFY, which resulted in a slight decline in groundwater storage. The average annual decrease in storage during this period was 22 AFY. This storage response indicates the Basin can support this range of operation, given appropriate natural recharge. Groundwater storage has increased a total of 2,215 acre-feet (AF) over the model period. The simulated increasing trend of groundwater storage in this MA provides an operational range that would support beneficial uses.

Coldwater Management Area. The average annual change in groundwater storage over the model period was an average annual decrease of about 2,000 AFY. Declines in storage in this MA were more pronounced early in the model period, averaging over 3,800 AFY between 1990 and 2004. Recent groundwater storage change has been relatively stable even with a significant drought period from 2014 to 2017. The local agencies pumping from the Coldwater MA have agreed to limit their pumping to a sustainable yield volume based on available recharge. Accordingly, groundwater pumping has declined from an average of over 6,500 AFY between 1990 and 2008 to approximately 3,000 AFY from 2009 through 2018. In the Coldwater MA, the simulated groundwater storage stabilized and largely recovered during the one to two years following droughts, but still showed a general decrease in groundwater storage due to increased groundwater production over the model period. Given the storage stability in the current period (2008 through 2018) and current groundwater management practices, groundwater storage will likely continue to increase on average and recover from short term droughts on the order of one to two years. These groundwater management practices include the existing agreement between local agencies to pump within a sustainable yield.

Ongoing aggregate mining in the Coldwater MA (and to a lesser extent Bedford MA) may impact both the inflows and outflows used to calculate the change in storage. Uncertainty exists about the role in storage changes of open pits used in quarry operations, specifically their contribution to additional recharge in wet years and/or additional outflow through evaporation or other processes. A potential management action to collect additional data related to quarry operations is discussed in Section 8.

6.3.6. Minimum Threshold

Undesirable results relative to groundwater storage have not occurred in the Basin and numerical modeling of future conditions indicate that groundwater storage can continue to be operated within historical limits. However, given the dynamic nature of the Bedford-Coldwater production wells, additional storage outside of the historical limits may be needed.

According to SGMA, the minimum threshold for storage is to be defined as the maximum groundwater volume that can be withdrawn without leading to undesirable results.

GSP Regulations allow the use of the groundwater level sustainability criteria (MTs and MOs) as a proxy for groundwater storage, provided that the GSP demonstrates a correlation between groundwater levels and storage. Groundwater levels and storage are directly related. This is demonstrated by comparison of groundwater level and storage trends, which reveal the same patterns of changes in pumping, response to drought, and recovery, as discussed in Section 5. The relationship of groundwater levels and storage is embodied in the calibrated numerical model.

The rationale for using groundwater levels as a proxy metric for groundwater storage is that the groundwater level MTs and MOs are sufficiently protective to prevent significant and unreasonable results relating to storage. Groundwater level MTs have been defined to protect supply wells (see Section 6.2.6) and are based on the following:

- A broad geographic distribution of Key Wells that are representative of production wells in the Basin;
- MTs that are based on operational parameters for existing water supply wells;
- Analysis of existing municipal supply wells with construction information and setting of MTs to avoid operational failure in these wells; and
- Groundwater level MTs that include two consecutive quarters in two years, providing early warning for storage changes, while also involving two-thirds or more of the Key Wells in each MA, thus involving a broad area, consistent with storage change.

As a practical matter, the availability of groundwater in storage will be constrained by MTs for water levels (including groundwater level proxies for depletion of interconnected surface water). The MTs for groundwater levels will be sufficiently protective of groundwater storage.

To summarize for the Bedford-Coldwater Basin:

> The **Minimum Threshold** for reduction of groundwater storage for all MAs is fulfilled by the minimum threshold for groundwater levels. The **Minimum Threshold** for defining undesirable results relative to chronic lowering of groundwater levels is defined at each Key Well (two consecutive quarters in two years, providing early warning for storage changes, in two-thirds or more of the Key Wells in each MA).

The Sustainability Goal for the Bedford-Coldwater Basin includes an objective to provide reliable storage for water supply resilience during droughts and shortages. Use of groundwater levels as a proxy also fulfills that objective. No additional MT definition is needed.

6.3.6.1. Relationship of Minimum Threshold to Other Sustainability Indicators

- **Water Levels.** The minimum thresholds for groundwater levels are protective of the beneficial use of the Basin – municipal, industrial, and other water supply; therefore, these levels are protective of and serve as a proxy for groundwater storage and the provision of reliable storage for drought and shortage.
- **Seawater Intrusion.** There is no possibility of seawater intrusion in Bedford-Coldwater Basin. Accordingly, there is no minimum threshold and no relationship with other minimum thresholds.
- **Subsidence.** Subsidence is linked to groundwater levels. Because the storage reduction minimum threshold would not cause water levels to drop below their minimum thresholds, it would not interfere with the subsidence minimum threshold.
- **Water Quality.** Maintenance of groundwater storage within historical and operational ranges would minimize any effects on water quality relative to water quality minimum thresholds. Groundwater quality issues in Bedford-Coldwater Basin are associated primarily with salt and nutrient loading and not likely to be affected by groundwater storage within historical and operational ranges.
- **Interconnected Surface Water.** The minimum thresholds for depletion of surface water flow are linked to groundwater levels near stream reaches with shallow groundwater. Those water levels are generally equal to or higher than the minimum thresholds for water levels in those areas. Thus, it is likely that the interconnected surface water threshold would constrain storage utilization.

6.3.6.2. Effect of Minimum Threshold on Sustainability in Adjacent Areas

The Bedford-Coldwater Basin is located downstream from the Elsinore Valley Subbasin along Temescal Wash. Groundwater flow directions are from the Elsinore Valley Subbasin to the Bedford-Coldwater Basin. The groundwater level MTs for the Bedford-Coldwater Basin would support maintenance of groundwater levels and storage within the operational range in the Bedford MA adjacent to the Elsinore Valley Subbasin. This in turn will support maintenance of operational groundwater storage in the neighboring Elsinore Valley Subbasin.

6.3.6.3. Effect of Minimum Threshold on Beneficial Uses and Users

Beneficial uses and users of groundwater storage include maintenance of interconnected surface water and associated groundwater dependent ecosystems (GDEs) and municipal, industrial and other groundwater users. The MTs for groundwater levels are based generally on operational considerations for wells, which recognizes that groundwater has been and is being used reasonably for the range of beneficial uses even during droughts. The storage minimum threshold is consistent with the water level minimum threshold, which means that available storage will be adequate to supply beneficial uses as long as water levels remain above their minimum thresholds.

6.3.6.4. Relationship of Minimum Threshold to Regulatory Standards

Other than SGMA, no federal, state or local standards exist for reduction of groundwater storage.

6.3.6.5. How Management Areas Can Operate without Causing Undesirable Results

A storage change in one Management Area would be associated with a change in water levels. That change could affect groundwater flow between that Management Area and an adjoining one. The boundary flow would only change if storage and water levels in the adjoining Management Area did not experience a similar change. Therefore, no incompatibility among Management Areas with respect to storage declines is anticipated.

6.3.6.6. How the Minimum Threshold will be Monitored

Monitoring for the groundwater levels MT, which is the proxy for groundwater storage, will be part of the BCGSA groundwater level monitoring program (as described in Section 7). Data and analytical results, including assessment of change in storage, are presented in GSP Annual Reports.

6.3.7. Measurable Objectives

Measurable Objectives is defined in GSP regulations as an operating range of groundwater storage, allowing changes in groundwater storage with varying hydrologic and surface water supply conditions and as with conjunctive management of surface water and groundwater. The groundwater level MTs provide a protective level that corresponds to the minimum threshold for storage, which would keep groundwater storage within the historical operating range. The 5-Year GSP Update could include consideration of using more of this storage locally as part of ongoing conjunctive use while also protecting shallow wells.

> The **Measurable Objective** for storage is fulfilled by the MO for groundwater levels, which maintains groundwater levels above the historical maximum groundwater depths in each Key Well (as quantified above in **Table 6-1**).

Groundwater conditions with respect to depletion of groundwater storage are already sustainable. Therefore, no interim milestones are needed to achieve sustainability by 2042.

6.3.7.1. Discussion of Monitoring and Management Measures to be Implemented

Management actions to prevent chronic reduction of groundwater storage and to provide groundwater reserves for drought will be the same actions for maintenance of groundwater levels. No other specific management actions for storage have been identified and no specific implementation is warranted.

6.4. SEAWATER INTRUSION

Seawater intrusion does not occur in the Bedford-Coldwater Basin because of its inland location. According to the GSP Regulations, the GSP is not required to establish criteria for such undesirable results that are not likely to occur. Accordingly, the remaining discussion in this section does not address seawater intrusion.

6.5. LAND SUBSIDENCE

Subsidence has not been a known issue in the Bedford-Coldwater Basin and undesirable results have not been reported. Nonetheless, the potential has been recognized that subsidence could occur as a result of groundwater pumping and groundwater level declines, typically in areas underlain by thick layers of fine-grained alluvial sediments.

As described in Section 4.3, available information on vertical land displacement (subsidence) includes estimates from InSAR satellite data systems. InSAR data provide mapping of ground surface elevations across the Basin, presented at regular (typically monthly) intervals.

InSAR data are made available by DWR from the TRE Altamira InSAR Dataset with vertical displacement data beginning in June 2015 and in monthly intervals thereafter until September 2019. The accuracy of the InSAR ground surface elevation change estimates is reported to be ±16 millimeters (mm), or ±0.052 feet (ft) (Towill 2020). While these data do currently represent a relatively short period of record, the InSAR data do not show significant changes in ground surface elevation in the Basin, which is characterized by small changes within the margin of error. Given the short records of these datasets and small vertical displacements, these data have not been analyzed systematically to identify specific areas that might be subject to long-term subsidence. As datasets are updated, that may be warranted in the future.

There are no data relating potential subsidence to water levels or groundwater pumping in the Basin. SGMA allows groundwater level data to be used as a proxy for subsidence; however, relationships between pumping, groundwater levels, and subsidence have not been determined to support that. Subsidence information from DWR InSAR data will be reviewed as it becomes available.

6.5.1. Description of Undesirable Results

Land subsidence is the differential lowering of the ground surface, which can damage structures, roadways, and hinder surface water drainage. Subsidence remains a potential risk and inelastic subsidence is irreversible. Potential undesirable results associated with land subsidence due to groundwater withdrawals include the following:

- Potential damage to building structures and foundations, including water facilities, due to variations in vertical displacement causing potential cracking, compromised structural integrity, safety concerns and even collapse.
- Potential differential subsidence affecting the gradient of surface drainage channels, locally reducing the capacity to convey floodwater and causing potential drainage problems and ponding.
- Potential differential subsidence affecting the grade or drainage of other infrastructure such as railroads, roads, and sewers.

- Potential subsidence around a production well, disrupting wellhead facilities or resulting in casing failure.
- Potential non-recoverable loss of groundwater storage as fine-grained layers collapse.

None of these undesirable results has been observed in the Basin. However, subsidence may be subtle and cumulative over time. Accordingly, the potential for future subsidence cannot be ruled out if regional groundwater levels were to decline below historical lows and minimum thresholds.

6.5.2. Potential Causes of Undesirable Results

As described in Section 4.3, changes in ground surface elevations may be caused by regional tectonism or by subsidence related to declines in groundwater elevations due to pumping. Regarding the former, the InSAR data show a general rising trend in the western portion of the Basin suggesting regional tectonic rise. In contrast, inelastic subsidence associated with groundwater pumping and level declines would generally show a long-term downward trend, with greater subsidence occurring during times of groundwater level decline (e.g., drought) and a flattening trend with no recovery during times of rising groundwater levels and reduced pumping (e.g., wet years).

As groundwater levels decline in the subsurface, dewatering and compaction of predominantly fine-grained deposits (such as clay and silt) can cause the overlying ground surface to settle. Land subsidence due to groundwater withdrawals can be temporary (elastic) or permanent (inelastic). While elastic deformation is relatively minor, fully recoverable, and not an undesirable result, inelastic deformation involves a permanent compaction of clay layers that occurs when groundwater levels in a groundwater basin decline below historical lows. This causes not only subsidence of the ground surface, but also compaction of sediments and loss of storage capacity.

Given the above, the potential for problematic land subsidence is affected by the proportion, overall thickness, and configuration of fine-grained sediments (with greater proportions and thicknesses suggesting greater potential). Because of the variability of local sediments, subsidence also is likely to be geographically variable. Moreover, the potential for subsidence is affected by the history of groundwater level fluctuations, such that areas with previous groundwater level declines may have already experienced some compaction and subsidence.

Subsidence is possible in Coldwater MA, due to the thickness of sediments and larger amount of pumping in this area. However, there is no evidence of thick, laterally continuous fine-grained materials that would be susceptible to subsidence. No data indicate that permanent inelastic subsidence has occurred.

6.5.3. Potential Effects on Beneficial Uses and Users

The lack of any reports of undesirable results is an indication of no noticeable effects. Nonetheless, some subsidence could have occurred because of historical groundwater level declines without being noticed and could have contributed to drainage or flooding problems, which are also affected by multiple and sometimes more noticeable factors including variable weather, changes in streams and drainage systems, land use changes in the watershed, erosion and sedimentation. Accordingly, continued tracking of subsidence is warranted.

6.5.4. Minimum Threshold

According to the GSP Regulations Section 354.28(c)(5), the minimum threshold for land subsidence is defined as the rate and extent of subsidence that substantially interferes with surface land uses. This section first addresses the rate at which subsidence substantially interferes with surface land uses and then describes how available InSAR data can be used to measure rate and extent across the Basin.

> The M**inimum Threshold** for subsidence is defined as a cumulative decline equal to or greater than one foot since 2015, which represents current conditions and the SGMA start date. This corresponds to a rate of decline equal to or greater than 0.2 feet in any five-year period.

The one-foot criterion is reasonable based on standards for flooding and drainage and on empirical data for well casing collapse:

- In the southwestern part of the Sacramento Valley, where documented cumulative subsidence has reached several feet, video surveys of 88 undamaged wells and 80 damaged wells showed that casing damage was uncommon in wells where subsidence was less than one foot (LSCE 2014).
- Ground floor elevations are recommended or required to be at least one foot above the Base Flood Elevation in some jurisdictions (see for example FEMA 2011 and City of Temecula 2020). Subsidence above one foot may cause some buildings to become flooded.
- The minimum freeboard along roadside ditches is often required to be one foot above the maximum anticipated water level (see for example San Diego County 2005). Greater subsidence may cause sewer and stormwater flows to flow in unintended directions.

Subsidence impacts can be relatively rapid and noticeable. However, in the Basin any subsidence in the future is likely to be gradually cumulative as would be its undesirable results. Accordingly, the 0.2 ft per 5-year rate of decline is an appropriate criterion, with the understanding that it will be re-evaluated in the 2027 GSP Update.

Based on available data and using the above criterion, significant and unreasonable subsidence has not occurred since 2015 in the Basin. Moreover, it is unlikely that the criterion will be exceeded in the future as groundwater pumping will be constrained with the MT set for groundwater levels and storage.

The extent of cumulative subsidence across the Basin will be monitored using the InSAR data provided on DWR's SGMA Data Portal website. The data consist of a closely spaced grid of elevation points approximately 300 feet apart and are characterized by considerable "noise," meaning that adjacent points often have very different readings at the scale of 1-2 inches. These data will be smoothed to provide results at a spatial scale at which subsidence would plausibly occur. These values for cumulative elevation change will then be compared annually with the minimum threshold criterion.

6.5.4.1. Relationship of Minimum Threshold to Other Sustainability Indicators

Subsidence related to groundwater is closely linked to groundwater levels. It is unlikely that significant inelastic subsidence would occur if groundwater levels remain above historical lows, which have been used to define groundwater level MOs. In addition, the operationally defined MT levels will prohibit significant pumping if water levels decline below historical lows. Accordingly, the minimum threshold for groundwater levels is consistent with and supportive of the objective to prevent subsidence undesirable results.

The subsidence MT would have little or no effect on other MTs. Specifically, subsidence MTs would not result in significant or unreasonable groundwater elevations, would not affect pumping and change in storage, would not affect groundwater quality, or result in undesirable effects on connected surface water.

6.5.4.2. Effect of Minimum Threshold on Sustainability in Adjacent Areas

The Bedford-Coldwater Basin is adjacent to the Temescal Basin and Elsinore Valley Subbasin. Groundwater flow directions are from the Elsinore Valley Subbasin to the Bedford-Coldwater Basin and from the Bedford-Coldwater Basin to the Temescal Basin with some drainage into the Temescal Wash. The MTs for the Basin represent current conditions; establishment of MTs and maintenance of groundwater levels would not affect the ability of the either the Temescal Basin or Elsinore Valley Subbasin GSAs to achieve or maintain sustainability, as the flows between the basins are relatively minimal, and therefore groundwater levels and, thus, subsidence, in one basin would not affect the other.

6.5.4.3. Effect of Minimum Threshold on Beneficial Uses and Users

Subsidence has not been reported in the Basin, but subsidence remains a potential undesirable result that may contribute incrementally to reduced drainage, increased flooding, or other undesirable results. The effects of establishing the numerical subsidence MT are beneficial because they support a greater chance of detecting subsidence, supporting management actions to maintain groundwater levels, and preventing significant subsidence.

6.5.4.4. Relationship of Minimum Threshold to Regulatory Standards

There are no federal, state or local standards specifically addressing subsidence. There are standards for flood depth, floodplain encroachment, freeboard in ditches and canals and slopes of gravity-flow plumbing pipes. These vary somewhat from jurisdiction to jurisdiction, but they are generally similar and were used as the basis for selecting the MT.

6.5.4.5. How Management Areas Can Operate without Causing Undesirable Results

The MTs are consistently conceived and applied across both MAs. Tracking and analysis of InSAR mapping over the next five years (until the 5-Year GSP update) may be revealing about the potential for subsidence in the Basin. Meanwhile, maintenance of groundwater levels at or above historical lows consistent with the water level MOs will tend to maintain current conditions between the successive MAs from upstream to downstream.

6.5.4.6. How the Minimum Threshold will be Monitored

The minimum threshold will be monitored using available InSAR areal data to identify any occurrence and areal extent of subsidence. Over the next few years, this evaluation will involve review of temporal InSAR data to discern seasonal elastic fluctuations and potential inelastic declines. In addition, any areal extent will be examined; this may involve smoothing of elevation changes over the InSAR grid to summarize the results to a spatial scale at which subsidence would plausibly occur. The cell values for cumulative elevation change will then be compared with the minimum threshold criterion.

6.5.5. Measurable Objectives

The Sustainability Goal includes the objective to prevent subsidence. Accordingly, the MO is zero subsidence. Undesirable subsidence results have not been reported, and accordingly, no interim milestones are defined.

6.5.5.1. Representative Monitoring

It is assumed that the InSAR subsidence monitoring programs will continue for the foreseeable future and InSAR data will be available from the DWR website. The GSP monitoring program for subsidence will involve annual download of InSAR data with analysis for signs of cumulative inelastic subsidence.

6.5.5.2. Discussion of Management Actions to be Implemented

Management actions to prevent subsidence will be coordinated with actions relative to maintenance of groundwater levels. These actions involve maintaining groundwater levels above historical low water levels and will prevent significant inelastic subsidence. No other specific management actions for subsidence have been identified and no specific implementation is warranted.

6.6. DEGRADATION OF WATER QUALITY

Degraded water quality can impair water supply and affect human health and the environment. Impacts to drinking water supply wells can result in increased sampling and monitoring, increased treatment costs, use of bottled water, and loss of wells, which may be taken offline because of quality issues. As described in Groundwater Conditions Sections 4.6 and 4.7, elevated concentrations in drinking water of some constituents, such as nitrate, can adversely affect human health.

Consideration of the causes and circumstances of water quality conditions is important in Bedford-Coldwater because general mineral quality is naturally poor, especially in the Bedford MA. Nonetheless, groundwater has been used for beneficial purposes including irrigation, municipal, and domestic purposes. Sustainable management is about use and management of groundwater without causing undesirable results but does not necessarily include reversing natural undesirable conditions. According to SGMA (§10727.2(b)(4)), a GSP may—but is not required to—address undesirable results that occurred before and have not been corrected by the SGMA benchmark date of January 1, 2015.

Salt and nitrate loading also are recognized as sources of groundwater quality deterioration. The sustainability goal to protect groundwater quality is not to reverse undesirable water quality conditions by 2042 but rather to prevent circumstances wherein future management activities might make water quality worse, and insofar as possible to improve water quality in the long run. Implementation of management actions is recognized as needed now and, whether or not the results are perceptible in the short term, such actions will be helpful in the long term.

6.6.1. Potential Causes of Undesirable Results

The quality of groundwater in Bedford-Coldwater Basin is characterized as mineralized, in part reflecting natural hydrogeologic processes (see Groundwater Conditions Section 4.4). Groundwater also has been affected by human activities including historical agriculture and current urban, industrial, and other land uses. While contaminant sources of groundwater quality degradation exist, these are effectively regulated as described in Groundwater Conditions Section 4.6 and regularly tracked as part of other monitoring programs.

As described in the Groundwater Conditions section, TDS and nitrate are constituents of concern for the Basin. While there are elevated natural background TDS concentrations in groundwater, TDS also is an indicator of human impacts including infiltration of urban runoff, agricultural return flows, and treated wastewater discharge. Natural nitrate levels in groundwater are generally very low, and elevated concentrations are associated with agricultural activities, septic systems, confined animal facilities, landscape fertilization, and wastewater treatment facility discharges.

Other constituents considered to be contaminants have been documented (see Groundwater Conditions Section 4.6.1 and 4.7) but occurrences of these are either under regulation by the Santa Ana Regional Water Quality Control Board (RWQCB) and State Water Resources Control Board (SWRCB) (e.g., perfluorooctanesulfonic acid [PFOS] and perchlorate) or are naturally occurring with no recent exceedances of MCLs and limited potential for mobilization due to management actions. In addition, mining activities are also regulated through the County Planning Department, the Surface Mining and Reclamation Act, and RWQCB discharge permits.

6.6.2. Description of Undesirable Results

The processes and criteria relied on to define Undesirable Results included review of available data and information summarized in the Plan Area and Groundwater Conditions sections and discussions with Bedford-Coldwater stakeholders and local agency representatives.

Undesirable Results are defined in the GSP Regulations (§354.26) as occurring when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the Basin. The GSA is not responsible for local problems or degradation caused by others. While the Bedford-Coldwater Basin includes regulated facilities with soil and groundwater contamination (see Groundwater Conditions Sections 4.4 and 4.6.1), these sites are under regulatory oversight by State and County agencies; the GSA does not have the mandate or authority to duplicate these programs. This GSP avoids management actions that would spread groundwater contamination through managed aquifer recharge, pumping, or other activities.

6.6.3. Potential Effects on Beneficial Uses and Users

Groundwater is a major source of supply in the Basin and supports a range of beneficial uses including municipal, recreational, industrial, and other uses. Beneficial uses of water and respective water quality objectives are defined by the RWQCB in the Santa Ana River Basin Water Quality Control Plan (Basin Plan).

6.6.4. Sustainable Management Criteria for Groundwater Quality

The definition of an Undesirable Result due to degraded water quality—TDS and nitrate concentrations—was evaluated in the context of regulatory objectives in each MA.

The GSA has selected a minimum threshold based on average conditions in monitored supply wells and regulatory limits. The average concentrations are totaled from each well and then divided by the total number of supply wells, to achieve a single value representing average conditions over the entire Basin. While this is slightly different than the suggested methods to determine sustainability, the GSA desired a single quantitative value to guide management. This is because the issues of concern in Bedford-Coldwater are focused on regional nitrate and salt loading, data are insufficient to define plumes or volumes of water, and the position of isocontours is not applicable.

6.6.4.1. Water Quality Monitoring Program

Currently 12 wells are regularly monitored for TDS and/or nitrate in the Basin by GSA member agencies, shown on **Table 6-2**. The wells generally are sampled semi-annually with lab analysis for general minerals and physical parameters. Accordingly, this data set can be used to detect a range of problems quickly, to track trends, allow geochemical investigation, and support focused management actions.

Table 6-2. Bedford-Coldwater Water Quality Monitoring Wells

Local Well Name	Agency
Corona Well 21	Corona
Corona Well 3	Corona
EVMWD Flagler 2A Well	EVMWD
EVMWD Flagler 3A Well	EVMWD
EVMWD Station 71	EVMWD
EVMWD Mayhew Well 2	EVMWD
TVWD Well 1A	TVWD
TVWD Well 4	TVWD
TVWD TP-1	TVWD
TVWD TP-2	TVWD
TVWD MW 2 - Driving Range	TVWD
Glen Ivy Well 1	Glen Ivy

6.6.4.2. Additional Water Quality Programs

In addition to existing monitoring, the BCGSA will conduct the following ongoing water quality coordination activities:

- Periodic review of data submitted to the Department of Pesticide Regulation (DPR), SWRCB Division of Drinking Water (DDW), Department of Toxic Substances Control (EnviroStor), and GeoTracker as part of the Groundwater Ambient Monitoring and Assessment (GAMA) database.
- Continue to participate in Salt and Nutrient Management Plan (SNMP) activities that include the Bedford MA portion of the Basin.
- Coordinate with the RWQCB and Riverside County Division of Environmental Health to discuss constituent trends and concerns in the BCGSA in relation to groundwater pumping.

The purpose of these reviews will be to monitor and summarize the status of constituent concentrations throughout the Basin with respect to typical indicators such as applicable MCLs or secondary MCLs (SMCLs). The GSP Annual Report and 5-Year Update will include a summary of the coordination and associated analyses of conditions. The GSP 5-year updates may include evaluation of whether additional minimum thresholds are needed.

6.6.5. Minimum Thresholds

Minimum Thresholds have been developed for nitrate and TDS using the best available information. MTs for nitrate and TDS are based on current conditions represented by average water quality results from all monitored wells between 2014 and 2019. The average value for each constituent was calculated for each well using results from all samples collected between 2014 and 2019. For wells with one sample, the single value was used; for wells with two or more samples, the average value was used.

These individual well averages were then averaged together for all wells in each MA and all wells in the Basin, as shown in **Table 6-3**. The resulting MA and Basin-wide average concentrations provide a simple metric for evaluating TDS and nitrate concentrations in the Basin. For reference, the MCL for nitrate as N is 10 mg/L and the SMCL for TDS is 1,000 mg/L.

Table 6-3. Summary of Recent Average Total Dissolved Solids (TDS) and Nitrate Concentrations by Management Area

	Bedford MA Average Concentration, 2014 - 2019	Coldwater MA Average Concentration, 2014 - 2019	Basin Wide Average Concentration, 2014 - 2019
Nitrate as N	3 mg/L	2 mg/L	3 mg/L
TDS	788 mg/L	488 mg/L	713 mg/L
Number of Wells	**9**	**3**	**12**

According to GSP regulations Section 354.28(c)(4) the minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the GSA to be of concern for the Basin. In setting minimum thresholds for degraded water quality, the GSA shall consider local, state, and federal water quality standards applicable to the basin. For the Bedford-Coldwater Basin, water quality MTs are based on the total number of wells (currently 12) and set for the entire Basin including both MAs.

> The TDS water quality **Minimum Threshold** Basin-wide is defined as 5-year average concentrations not exceeding the 1,000 mg/L Secondary MCL for TDS.
>
> The nitrate water quality M**inimum Threshold** Basin-wide is defined as 5-year average concentrations not exceeding the 10 mg/L drinking water MCL for Nitrate as Nitrogen.

These MTs are presented with full recognition of data gaps and uncertainties, and with commitment incorporated in this GSP to investigate increasing trends in nitrate and salt loading if they occur, and to coordinate appropriate management actions with regulatory agencies such as the RWQCB.

While the TDS and Nitrate MTs were selected based on the MCL (drinking water standards) to protect the beneficial uses of the Basin, it is recognized that there are other water quality objectives. The Upper Temescal Valley SNMP sets forth anti-degradation goals for the Bedford portion of the Basin, and the RWQCB Basin Plan has additional objectives for the Coldwater MA. As noted in Section 4.5.1, the SNMP objectives for the Bedford area are lower than the MCLs. However, the fundamental approach of this GSP is to protect beneficial uses as identified in the Sustainability Goal (Section 6.1). The BCGSA will work with other agencies to help achieve their objectives for water quality but will not define sustainability based on those objectives.

Given historical and ongoing groundwater use, current water quality conditions are considered sustainable. As described in Section 6.6.6, Measurable Objectives, the approach is to implement management actions that will maintain or reduce TDS and nitrate concentrations in the future.

6.6.5.1. Relationship of Minimum Threshold to Other Sustainability Indicators

Three of the other sustainability indicators (groundwater level declines, storage depletion, subsidence) are directly linked to groundwater levels, while the sustainability indicator for connected surface water-groundwater dependent ecosystems is related to a rate or volume of surface water depletion, also linked to groundwater levels. The MTs for water quality are not known to be directly related to specific groundwater levels or fluctuations in groundwater levels. Nonetheless, general relationships are recognized, for example that contaminants may be mobilized by changing groundwater levels or flow patterns. Accordingly, the water quality MTs will help guide potential projects that alter groundwater levels or flow.

6.6.5.2. Effect of Minimum Threshold on Sustainability in Adjacent Areas

The Bedford-Coldwater Basin is adjacent to the Elsinore Subbasin and Temescal Basin. Given the likelihood of continued flow between these basins remaining relatively similar current conditions, groundwater flow is likely to remain unchanged and groundwater quality in Bedford-Coldwater is unlikely to affect downstream Temescal Basin.

6.6.5.3. Effect of Minimum Threshold on Beneficial Uses and Users

The establishment of the MTs reflects the available data regarding the current condition of the Basin relative to TDS and nitrate concentrations. Establishing the MTs represents no change and recognizes that groundwater has been and is being used reasonably for the range of beneficial uses. The MTs represent a quantified starting point for protection of groundwater quality and for projects and management actions to improve groundwater quality, consistent with a best management practices approach.

6.6.5.4. Relationship of Minimum Threshold to Regulatory Standards

The MTs have been established with direct reference to regulatory standards, most notably the State-established MCLs. Other standards exist (including the Basin Plan Objectives set by the RWQCB and the Salt Nutrient Management Plan) that are lower (more strict) than the MTs. However, the Sustainability Goal and MTs are based on drinking water standards in order to protect local beneficial uses of groundwater.

6.6.5.5. How Management Areas Can Operate without Causing Undesirable Results

For both MAs, the goal is to protect groundwater quality with reference to beneficial uses and all MTs are based on available information and current conditions. It is not known if the current conditions represent equilibrium conditions between the two MAs or if future changes may occur between them. Future implementation of management actions and projects will be guided by monitoring data and by the consistent goal to protect groundwater quality in both MAs.

6.6.5.6. How the Minimum Threshold will be Monitored

The GSP is using the best available data from the BCGSA member agencies. The existing monitoring program will be improved and expanded to include dedicated monitoring wells. These will be included within the regular sampling schedule of the BCGSA and will build on historical records with data on specific constituents and parameters. The data from these dedicated wells will be used to reassess this threshold at the next GSP 5-Year update.

6.6.6. Measurable Objectives

The sustainability goal is to protect groundwater quality with reference to beneficial uses, with general objectives of maintaining groundwater quality, preventing circumstances where future management activities might make water quality worse, and improving groundwater quality in the long term.

6.6.6.1. Description of Measurable Objectives

Measurable Objectives are defined in this GSP using the same metrics and monitoring data as used to define MTs and are established to maintain or improve groundwater quality. Given uncertainties presented by data limitations, a reasonable margin of safety includes the possibility of "negative" monitoring results while positive progress is being made.

> The **Measurable Objective for TDS** is defined as maintaining or reducing 5-year average concentration in the Basin below the TDS Secondary MCL (1,000 mg/L) based on conditions documented in the Annual Reports.
>
> The **Measurable Objective for nitrate** is defined as maintaining or reducing the 5-year average concentration in the Basin below the nitrate as nitrogen MCL (10 mg/L) based on conditions documented in the Annual Reports.

Measurable Objectives will be evaluated in increments of five years and the numeric values will be presented with comparison to current conditions. This comparison will be discussed in the context of actual progress in implementing measures to improve monitoring and management.

6.6.6.2. Discussion of Monitoring and Management Measures to be Implemented

The strategy of this GSP is to identify and implement monitoring and management measures to reduce nitrate and TDS loading. Monitoring and management actions already undertaken are summarized in Plan Area Section 2.1.4. and would be continued. Additional monitoring measures are discussed in following sections.

6.7. DEPLETIONS OF INTERCONNECTED SURFACE WATER

This section builds and extends the discussion in Chapter 4 and the discussion of interconnection of surface water and groundwater. That section provided information on surface water-groundwater connections (both seasonally and with wet years and drought), identification of potential GDEs, distribution of riparian vegetation, and assessment of animal species that rely on groundwater-supported streamflow.

6.7.1. Description of Undesirable Results

If a stream is hydraulically connected to groundwater, pumping from nearby wells can reduce the amount of stream flow by intercepting groundwater that would have discharged into the stream or by inducing seepage from the stream. Undesirable results associated with stream flow depletion include reduced quality and quantity of aquatic and riparian habitats and reduced water supply to downstream users. Conceptually, adverse habitat impacts can result from decreased rainfall, decreased stream flow and/or lowered groundwater levels. These variables are highly correlated in time: droughts include rainfall reductions, decreased stream flows, and lowered groundwater levels at a time when habitat impacts are usually the most severe. Furthermore, droughts and wet periods are a natural feature of California's climate and are associated with waxing and waning of habitat conditions.

6.7.2. Potential Causes of Undesirable Results

Depletion of interconnected surface water by groundwater pumping can impact a variety of beneficial uses of surface water. A systematic evaluation of each potential impact is warranted, including impacts on downstream water users, habitats around isolated springs and wetlands, and plants and animals that rely on flow or shallow water table conditions along streams.

6.7.2.1. Surface Water Users

There are no known diverters of surface water from Temescal Wash. Lee Lake Dam and reservoir (just upstream of the Basin) were built in the late 19th century on the site of a small natural lake for the purpose of storing and supplying water to what is now the City of Corona (Ellerbee 1918). The lake no longer serves a water supply function, and in recent years it has been operated solely for recreational fishing under the name "Corona Lake".

Although not exactly a diversion, EVMWD obtained a permit that is listed as a diversion to reduce its historical discharges of treated effluent from the Regional Wastewater Reclamation Facility (WRF) to Temescal Wash upstream of the Basin, instead discharging most of that water to Lake Elsinore. Up to 3.87 cubic feet per second (cfs) of wastewater discharges that had been going to the Wash have been diverted to Lake Elsinore since 2008, as part of a lake level management plan (Permit 21165 [Application30502]). On January 24, 2020, the SWRCB approved EVMWD's request for a time extension to generate and divert the full amount of wastewater indicated in the permit. Downstream of the Basin there is no required minimum discharge from Temescal Wash into the Prado Wetlands at the downstream end of the Wash, near Corona. However, there are minimum required discharges of treated wastewater into the wetlands from several wastewater treatment plants in the Corona area north of the Bedford-Coldwater Basin.

6.7.2.2. Isolated Springs and Wetlands

Small off-channel wetlands are included in the Natural Communities Commonly Associated with Groundwater (NCCAG) on-line vegetation geodatabase (DWR et al. 2020). Almost all areas mapped as wetlands are along Temescal Wash and covered by the evaluation of riparian vegetation presented in detail below. A handful of polygons totaling 1.4 acres in the Bedford-Coldwater Basin are located along tributary streams or in low areas west of Temescal Wash. The vegetation is described as “seasonally flooded”, and the depth to groundwater at those locations is over 100 feet. The mapped vegetation is thus supported by seasonal ponding of rainfall runoff, not groundwater.

6.7.2.3. Animals Dependent on Groundwater

Animals dependent on groundwater include fish that permanently reside in Temescal Wash or migrate up and down the Wash during the high flow season, amphibians, and birds that inhabit riparian vegetation. Temescal Wash historically supported a steelhead trout run, remnants of which persist as resident rainbow trout in Coldwater Canyon Creek (which enters the Bedford-Coldwater Basin from the Santa Ana Mountains). Currently, perennially ponded areas along the lower reaches of the creek support robust population of invasive and exotic predatory species including bass, bullhead, sunfish, carp, and some slider turtles (Russell 2020). Arroyo chub is another fish that was once present in the Santa Ana River watershed, but it has been extirpated in most streams due to these exotic predators. Riverside County Resource Conservation District (RCRCD) implemented the Temescal Creek Native Fish Restoration Project in the early 2000s, which focused on eliminating nonnative plant and animal species that prey upon or create unfavorable habitat conditions for native fish species (Western Riverside County Regional Conservation Authority 2020). However, flow conditions in Temescal Wash do not currently support native fish (Russell 2020).

Animals dependent on riparian vegetation can also be considered dependent on groundwater. The Western Riverside County Multi-Species Habitat Conservation Plan (MSHCP) evaluates the presence and habitat needs of 146 species. The only ones mapped in the vicinity of the Basin are upland plants and burrowing owls, none of which are dependent on groundwater (Western Riverside County Regional Conservation Authority 2020). The federally threatened California coastal gnatcatcher is a bird species associated with sage scrub environments. The designated critical habitat areas are almost exclusively in upland areas outside the Basin. However, edges of a few mapped habitat areas border the Temescal Wash corridor (see **Figure 4-20**).

The Upper Santa Ana River Habitat Conservation Plan (SARHCP) also covers the Temescal Wash watershed and differs from the Western Riverside County MSHCP primarily in providing Endangered Species Act compliance for an additional set of activities related to water infrastructure construction and operation (USARSRA 2020). Although the SARHCP documents habitat suitability and historical observations of several listed species along Temescal Wash, its main focus is on habitat along the mainstem Santa Ana River. Species with fewer than five historical sightings and little suitable habitat include Arroyo chub, southwestern pond turtle, southwestern willow flycatcher, and yellow-breasted chat. There have been more than 25 historical sightings of Least Bells vireo, but no suitable habitat is mapped along Temescal

Wash. The flow regime in Temescal Wash is characterized as ephemeral (correct in many locations) because flow is “heavily diverted for human use” (incorrect) and that local areas of persistent flows result from agricultural return flows (incorrect). No mention is made of wastewater discharges, which are a larger factor in the flow regime. The surface hydrologic model used to support the SARHCP analysis only extends about one mile up the lowermost channelized reach of Temescal Wash. A groundwater model used to support the SARHCP projected declining water levels in the Prado wetlands area, but the plan includes no mitigation measures related to groundwater.

In summary, Temescal Wash does not appear to be a significant habitat for any listed animal species that would potentially be impacted by groundwater pumping or water levels. However, riparian shrubs and trees and non-listed animal species that use them could potentially be impacted during droughts if lowered groundwater levels cause vegetation die-back or mortality.

6.7.2.4. Riparian Vegetation

The beneficial use of interconnected surface water most likely to be impacted by groundwater pumping is riparian vegetation along Temescal Wash. The Wash traverses three groundwater basins along its 26-mile course from Lake Elsinore to the Prado Wetlands on the Santa Ana River. The entire length of the Wash was evaluated for this GSP to maximize the available information relating vegetation to groundwater and surface flow conditions. The assortment of vegetation types is roughly the same along the entire Wash and includes (in decreasing order of abundance) red willow, California sycamore, Gooddings willow, mulefat and Fremont cottonwood.

The extent and health of riparian vegetation along Temescal Wash was evaluated using three data sets: 1) Google Earth aerial imagery dating back to 1994 (Google Earth 2021), 2) NCCAG mapping of riparian vegetation representing a composite of numerous vegetation mapping efforts around the state (most dating from the early 2000s) (DWR et al. 2020), and 3) TNC’s GDE Pulse on-line mapping tool showing vegetation moisture status based on satellite data (TNC 2020).

Inspection of the aerial imagery revealed substantial mortality of riparian trees at many locations along the entire length of Temescal Wash from 2014 to 2016 and little recovery by 2018 (the most recent image). As an example, the evolution of vegetation along the reach that passes through Dos Lagos Golf Course (near Temescal Canyon Road and Cabot Drive) is illustrated by images from 1994, 2006, 2014, 2016, and 2018 in **Figure 6-2**. In 1994, which was just after a prior drought and before urban development, there was moderate coverage of riparian trees in the Temescal Wash channel. Canopy extent and density increased incrementally through 2006 and up to 2014. The 2014 through 2016 drought caused extensive tree mortality evident in the 2016 photo. Only a few trees had recovered by 2018, in spite of wet conditions in 2017.

The health and vigor of riparian vegetation cannot be reliably detected in aerial photographs. However, spectral analysis of light reflected from the vegetation does provide that information. Two commonly used metrics of vegetation health and vigor are the normalized difference vegetation index (NDVI) and normalized difference moisture index (NDMI), both of which involve ratios of selected visible and infrared wavelengths. NDVI relates to the greenness of vegetation and NDMI relates to transpiration. These metrics detect sub-lethal vegetation stress not visible in normal aerial imagery. TNC compiled these two metrics from historical satellite imagery for riparian vegetation throughout California and incorporated it into the GDE Pulse on-line mapping tool (TNC 2020). The tool evaluates the metrics for every vegetation polygon in the NCCAG maps. For each polygon, the tool displays time series plots of annual summertime NDVI and NDMI from 1985 through 2019. GDE Pulse data for NDVI and NDMI confirmed large declines in both of those metrics during 2013 through 2016 in most vegetation polygons along Temescal Wash. Some uncertainty in the methodology is apparent in occasional large differences in trends between adjoining polygons. Declines during 1984 through 1990 were of similar magnitude but not as abrupt in most locations.

A key question is whether vegetation die-back during the recent drought was due to lowered groundwater levels or reduced surface flow. There reportedly was year-round surface flow in the Wash derived from wastewater discharges prior to the drought, and a combination of reduced discharges and drought conditions killed up to 80 percent of the tree canopy in some locations along the Wash (Russell 2020). A careful comparison of the locations and timing of vegetation changes during the 1990 to 2018 period with the location and timing of changes in surface flow, groundwater pumping, and groundwater levels allows some tentative conclusions to be drawn about which factors contribute to vegetation die-back.

6.7.2.4.1. Groundwater Pumping and Shallow Groundwater Levels 1990 through 2018

Pumping from wells in the Warm Springs and Lee Lake MAs in the Elsinore Valley Subbasin upstream from the Basin and the Bedford MA in the Bedford-Coldwater Basin along Temescal Wash was about three times greater during 1990 through 1993 than during the 2013 to 2016 drought, as shown in **Figure 6-3**. If water levels were only a function of pumping, they would have been lower in the early 1990s than during the recent drought, but that was not the case (except for 1990). Hydrographs of groundwater levels are available for about 22 wells at about 10 locations along the 15-mile length of Temescal Wash in the Elsinore and Bedford-Coldwater Basins. Many of the wells are in clusters at a single location. At five of the locations, water level records date back to the early 1990s. Hydrographs of water levels at selected wells near Temescal Wash are shown in **Figure 6-4**. Many wells with water-level data are production wells with significant, frequent pumping drawdown. Estimation of static water levels in those wells can be inaccurate in years when the well was operated frequently because it can take days for water levels a pumping to recover to background static levels, and pumping schedules do not always allow that much downtime.

Progressive water level declines during 2012 through 2015 were the largest in the period of record for most wells. However, at the two locations with records dating back to 1990 (Gregory and Barney Lee), water levels were as low or lower in 1990 as in the 2012 to 2015 period. 1990 was the final year of another major drought, which can be seen as the declining trend in the cumulative departure of rainfall during 1984 through 1990. This suggests that low groundwater levels during 1984 through 1990 might also have caused substantial die-back, after which vegetation slowly recovered.

6.7.2.4.2. Surface Flow 1990 through 2018

Surface flow in Temescal Wash is not strongly correlated with vegetation die-back when the full 1990 through 2018 period is considered. Natural flow in Temescal Wash is mostly ephemeral and sporadic, as indicated by flows at various stream gages in the region (see **Figure 4-15**). Large natural flow events occur only in response to storm events in winter. In the absence of a shallow water table, intermittent winter flow events would not be sufficient to sustain riparian vegetation through the dry season.

In contrast, discharges from wastewater reclamation facilities are generally more sustained and have also contributed significant flow to Temescal Wash. Monthly average discharges from four wastewater reclamation facilities along Temescal Wash during 1990 through 2018 are shown in **Figure 6-5** and are described below:

- **Eastern Municipal Water District (EMWD)**. By far the largest discharges have been from EMWD near the upper end of Temescal Wash in the Elsinore Subbasin. EMWD's service area is located outside the Bedford-Coldwater Basin and beyond the jurisdiction of this and neighboring GSPs. The EMWD discharges since 2005 have typically been around 40 to 50 cfs, which is enough to produce flow down the entire length of Temescal Wash. This is confirmed by gaged flows at the outlet of Lee Lake (7 miles downstream of the discharge), which are also shown in the **Figure 6-5**. Peak flows at that location coincided with EMWD discharges and were about 20 cfs smaller, reflecting percolation losses between the discharge point and the lake.
- **Elsinore Valley Municipal Water District (EVMWD) Regional WRF**. The Regional WRF is also located near the upstream end of Temescal Wash. Its discharges shifted primarily from the Wash to Lake Elsinore starting around 2008. A small (0.77 cfs) discharge has been required continuously since then, and larger discharges occasionally resume when lake levels are high. The change in discharge operations pre-dated the drought by about 6 years, and vegetation along the 5-mile reach immediately downstream of the discharge location remained relatively healthy throughout the drought. Therefore, the change in EVMWD discharges did not appear to be a significant contributor to vegetation mortality during 2014 through 2016.
- **Temescal Valley Water District (TVWD) Lee Lake WRF**. The Lee Lake WRF is located about halfway down the Bedford-Coldwater Basin reach of Temescal Wash. Its discharges decreased starting in 2013, which coincided with the start of the drought. The discharges had not been large (about 0.8 cfs) and had already decreased by about half since 2005 due to increased wastewater recycling.
- **City of Corona WRF-3**. This WRF discharges a relatively small (about 0.2 cfs) flow to Temescal Wash upstream of Cajalco Road near the downstream end of the Bedford-Coldwater Basin. Those discharges would not influence vegetation patterns observed upstream.

The hiatus in EMWD discharges between January 2013 and February 2017 coincided with the drought and with the observed vegetation mortality. Because groundwater levels also declined to exceptionally low levels during that time, the cause of vegetation die-back cannot be uniquely determined based solely on information for that time period.

Looking farther back in time, riparian vegetation was generally able to increase in extent during the 1990s and early 2000s, when EMWD discharges were rare and generally small. This indicates that the vegetation was not dependent on those flows to become established. By inference, the mortality during 2014 through 2016 was not caused solely by the interruption in the discharges.

6.7.2.5. Riparian Vegetation Summary

The relationship between groundwater pumping, groundwater levels, and vegetation die-back is not clear-cut. If there were a direct correlation between the variables, one would expect to have seen lower groundwater levels and more die-back during the 1990s than during the 2014 to 2016 period, which was not the case. At a more general level, however, riparian vegetation along Temescal Wash was continuously dense and healthy in the Warm Springs portion of the Elsinore Subbasin, where groundwater pumping was very small throughout 1990 to 2018, large wastewater discharges were immediately upstream, and groundwater levels remained consistently shallow. The greatest impacts were along the downstream end of the Bedford Management Area in the Bedford-Coldwater Basin, where groundwater pumping was relatively intense, local wastewater discharges were relatively small, and groundwater levels experienced large declines during 2012 to 2016 (no data for 1990).

6.7.3. Definition of Undesirable Results

The Sustainability Goal includes an objective to support beneficial uses in the Basin, and specifically those related to interconnected surface water. Consistent with that objective, undesirable results of excessive depletion of surface water are:

> Riparian vegetation die-back or mortality during droughts of a magnitude that disrupts ecological functions or causes substantial reductions in populations of riparian-associated species.

6.7.4. Potential Effects on Beneficial Uses and Users

The analysis presented in this section demonstrates that groundwater conditions are currently sustainable with respect to inter-connected surface water and GDEs. There are no users of surface water in the Basin and there does not appear to be a correlation between groundwater levels and streamflow. Basin outflows appear sufficient to meet the needs of downstream water users. The distribution and health of riparian vegetation does appear to be correlated with groundwater levels, but those levels have recovered since the most recent drought and riparian vegetation is in the process of recovering as well.

6.7.5. Sustainable Management Criteria for Interconnected Surface Water

SGMA requires that the minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results (§354.28(c)(6)). However, GSP Regulations allow GSAs to use groundwater elevation as a proxy metric for any of the sustainability indicators when setting minimum thresholds and measurable objectives (23 California Code of Regulations [CCR] § 354.28(d) and 23 CCR § 354.30(d)).

It would be difficult to define a minimum threshold in terms of flow depletion in this Basin because phreatophytic riparian vegetation appears to be more correlated with areas where depth to water is consistently shallow than with the magnitude or duration of surface flow. Because there are undoubtedly gains and losses of surface flow along Temescal Wash, and the vegetation impacts are associated with a low water table when surface flow is not present, it is reasonable to define the minimum threshold in terms of water levels instead of flow.

6.7.6. Minimum Threshold

Given the above, the minimum threshold is defined here by groundwater levels. As noted previously, wells in the groundwater levels monitoring program are production wells with relatively deep screens that have not been sited and designed for tracking surface water-groundwater interactions. The lack of such shallow monitoring wells is a data gap and a source of uncertainty. Hence, the minimum threshold described here is initial. Nonetheless, it is intended to be protective of GDEs until the monitoring program can be refined to better represent near-stream shallow conditions.

Therefore, in the Bedford-Coldwater Basin:

> The **Minimum Threshold** for depletion of interconnected surface water is the amount of depletion that occurs when the depth to water in wells near areas supporting phreatophytic riparian trees is greater than 35 feet for a period exceeding one year.

This threshold corresponds approximately to the depth to water beneath the creek channel near water-level monitoring wells during 2014 through 2016 and is defined for static water levels in the wells listed in Section 6.7.6.5. Given the above uncertainty in the relationships between groundwater pumping, groundwater levels and the health of riparian vegetation, the minimum threshold for interconnected surface water presented here must be considered tentative and subject to revision in future GSP updates. The BCGSA is committed to monitoring vegetation and examining possible management actions to avoid undesirable results. However, given the uncertainty of the relationships between pumping, stream flow, water levels and riparian vegetation health, exceedance of the minimum threshold will first trigger additional study to assess how GSA pumping is affecting shallow water levels.

Undesirable results are considered to commence if water levels along more than half of the total length of reaches in the Basin with dense riparian trees exceed the minimum threshold.

By this definition, undesirable results did occur in the Bedford-Coldwater Basin during the recent drought, because vegetation die-back occurred along about 3.9 miles of the channel, or about 57 percent of the total length of Temescal Wash in the Basin.

6.7.6.1. Relationship of Minimum Threshold to Other Sustainability Indicators

- **Groundwater Levels.** All the wells used to evaluate the minimum threshold (see Section 6.7.6.5) are also representative wells used for compliance with the minimum threshold for groundwater levels. The groundwater level minimum threshold involves two consecutive quarterly water-level measurements rather than a period of one year. For the wells included in both sets of criteria, the interconnected surface water threshold water levels are generally higher than the water-level thresholds. That is, along the GDE stream reaches, the interconnected surface water criteria restrict water-level declines more than the water-level criteria do. This is the logical result of the different objectives of the two sets of criteria.
- **Groundwater Storage.** The minimum threshold for interconnected surface water would similarly be more restrictive than the minimum threshold for groundwater storage near GDE reaches, because the latter is functionally the same as the minimum threshold for water levels.
- **Seawater Intrusion.** Seawater intrusion would not occur in the Basin due to its inland location. No minimum threshold was defined and there is no consistency issue.
- **Land Subsidence.** Significant land subsidence is only likely to occur with groundwater levels below historical minimum levels. The levels specified as minimum thresholds for interconnected surface water are within the historical range and thus unlikely to cause subsidence.
- **Water Quality.** Water quality issues in the Basin are primarily associated with dispersed loading of nitrate and salinity and long-term increases in ambient concentrations of those constituents. Those processes are generally independent of groundwater levels. Groundwater outflow is an important mechanism for salt removal that requires relatively high groundwater levels on a long-term average basis. High levels and groundwater discharge into streams also benefit riparian vegetation and aquatic habitat. Therefore, the minimum threshold for interconnected surface water is consistent with the minimum threshold for water quality.

6.7.6.2. Effect of Minimum Threshold on Sustainability of Adjacent Areas

The areas of interconnected surface water in the Basin are those that are upstream of and adjoining the Temescal Basin. Groundwater and surface water flow is from the Bedford-Coldwater Basin toward the Temescal Basin, consistent with topography. If water levels in the Bedford Management Area were lowered, outflow to the Temescal Basin would decrease. The water levels used to define the minimum threshold for depletion of interconnected surface water are within the historical range of water levels and thus would not cause unreasonable impacts on groundwater availability in the Temescal Basin. By protecting vegetation along the Temescal Wash—which is a shared waterway between the basins—the minimum threshold will protect those resources for the benefit of both Basins.

6.7.6.3. Effect of Minimum Threshold on Beneficial Uses

Surface diversions are not a source of supply in the Basin; all water uses are supported by imported water or groundwater. With respect to groundwater, this GSP does not propose increases in groundwater pumping above existing amounts, so groundwater levels are expected to remain within the historical range. In areas where the minimum-threshold water level for interconnected surface water is higher than the minimum-threshold for chronic lowering of groundwater levels, the interconnected surface water threshold improves groundwater availability.

The minimum threshold is expected to protect beneficial uses of surface water for riparian habitat maintenance.

6.7.6.4. Relationship of Minimum Threshold to Regulatory Standards

Other than SGMA, there are no local, state, or federal regulations that specifically address stream flow depletion by groundwater pumping. The California and federal Endangered Species Acts protect species listed as threatened or endangered, including California coastal gnatcatcher. The minimum threshold for depletion of surface water is designed to prevent groundwater conditions from impacting those species beyond the level of impact that has historically occurred.

6.7.6.5. How the Minimum Threshold Will Be Monitored

Eight wells that are currently monitored for water levels are near stream reaches where interconnected surface water has been identified. These wells are listed below and shown on **Figure 6-1**.

- TVWD TP-1 and TP-2
- TVWD Well 1 (old well)
- TVWD Well 4
- EVMWD Flagler 2A and 3A
- Corona Non-Potable Wells 1 and 2

The wells listed above are all mostly water supply wells with relatively deep screens. They are useful for relating future conditions to historical ones, but they do not provide a reliable indication of the true water table elevation near the ground surface because shallow wells can have different water levels than deep wells.

Shallow monitoring wells are needed in riparian areas to provide accurate water table information and elucidate the relationship between deep water levels and vegetation conditions. One of the management actions in this GSP is to conduct surveys of Temescal Wash to evaluate the feasibility and need for installing shallow monitoring wells. Over time, minimum threshold groundwater elevations can be refined as a result of these surveys.

6.7.7. Measurable Objective

The measurable objective for interconnected surface water is an amount of depletion that is less than the amount specified as the minimum threshold. Given the uncertainty in the correlation between groundwater levels and vegetation health, no specific rise in shallow groundwater levels or increase in stream flow is identified as providing a preferred set of GDE conditions.

Groundwater conditions with respect to interconnected surface water and most GDE parameters are currently sustainable. Therefore, no interim milestones are needed to achieve sustainability at this time.

6.7.8. Data Gaps

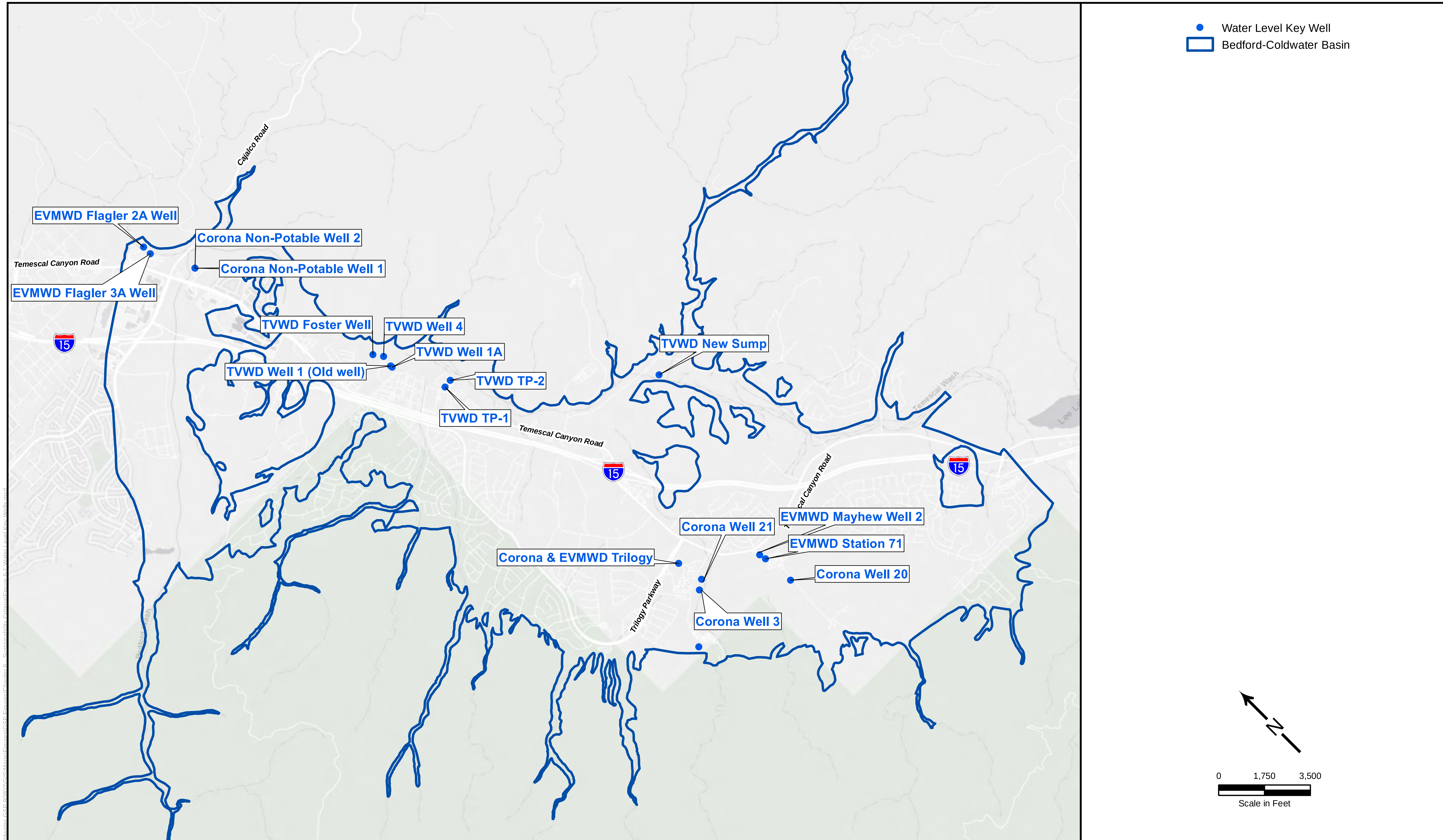
There are several data gaps that might be contributing to the lack of clear relationships between groundwater pumping, groundwater levels and vegetation die-back. These include:

- Wells with water-level data are clustered in a small number of locations. Water levels are unknown in many areas that experienced vegetation die-back.
- Almost all wells with water-level data are also production wells. Water-level drawdown that results from pumping is greater and more persistent near a pumping well than in areas far from the well. Consequently, it is difficult to accurately estimate depth to the water table in areas where there is no nearby pumping.
- The wells with data are not in the creek channel or within the areas with dense riparian vegetation, and the vertical distance between the wellhead and creek channel has not been surveyed at any well locations. The elevation difference can be estimated, but the lack of measured data produces uncertainty in estimating the depth to water at the channel.
- Vertical water-level gradients within the aquifer system are largely unknown. Pumping commonly creates vertical water-level gradients within basin fill materials, such that the true water table near the land surface is higher than the water level in a deep production well at the same location. Some indication of vertical gradients can be gleaned from a study of flow and vegetation along Temescal Wash downstream of EVMWD’s Regional WRF in 2007 to 2008 (MWH 2008). Although the WRF is in the Elsinore Subbasin, vertical gradients caused by pumping would be similar in the Bedford MA. Shallow (seven-foot-deep) piezometers were installed in the channel at several locations along a four-mile reach extending downstream from the WRF. Water levels at piezometer TW7, CM2 and TW2 are included in the hydrographs for the Alberhill and Cemetery wells (see **Figure 6-4**). Unfortunately, most of the piezometers are not located near production wells. In terms of depth to water, the piezometer water levels appear generally shallower and more stable than are water levels in the nearest monitored production wells, which is consistent with the presence of vertical gradients caused by pumping at depth.

6.7.8.1. Discussion of Monitoring and Management Measures to be Implemented

Management actions to improve monitoring and management of interconnected surface water in the Basin will include tracking trends in groundwater levels near Temescal Wash,

investigating groundwater/surface water interactions near Temescal Wash and taking action as necessary.

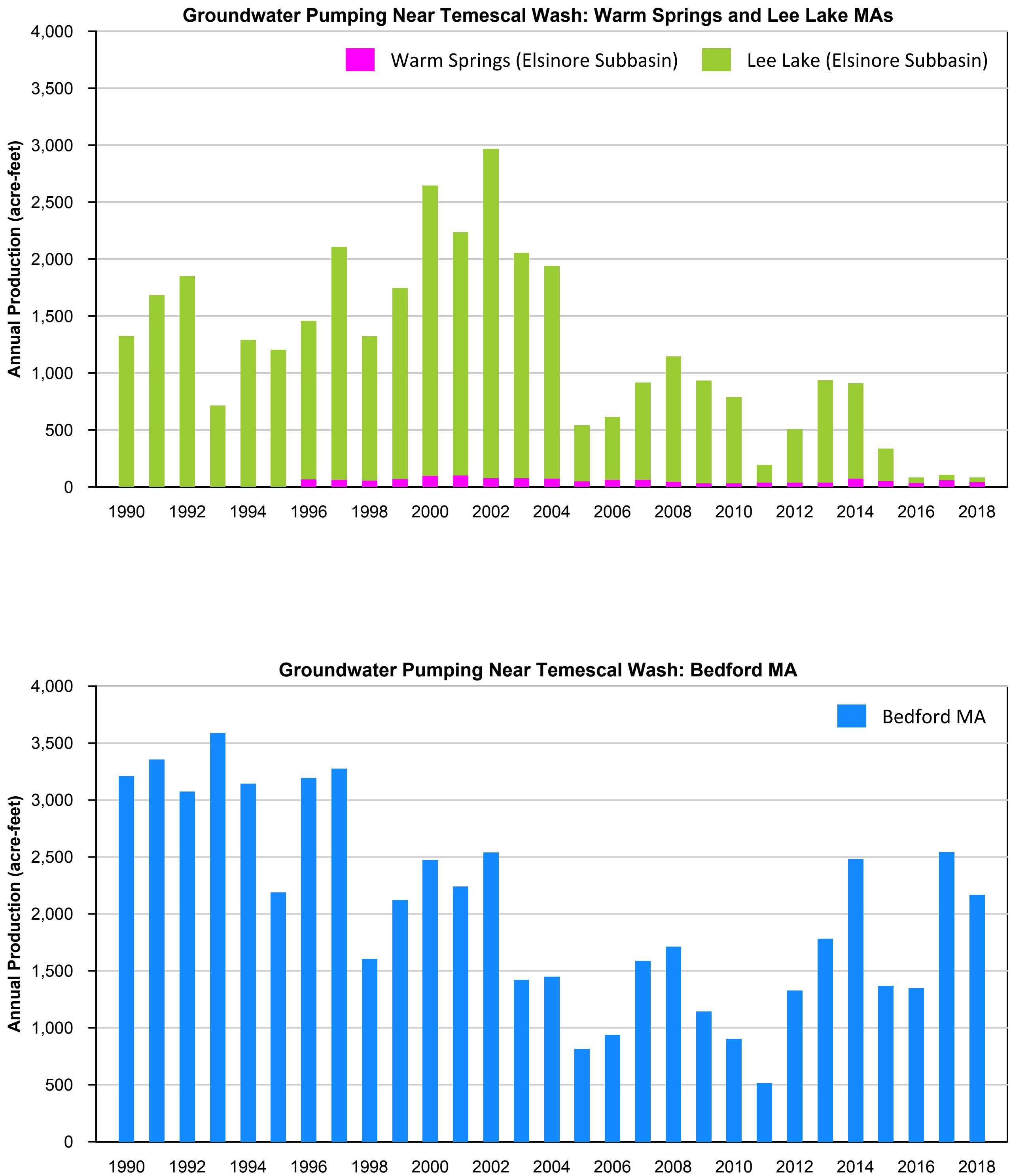


TODD GROUNDWATER

Figure 6-1
Water Level Key Wells

TODD GROUNDWATER

Figure 6-2
Aerial Images of Riparian Vegetation 1994-2018

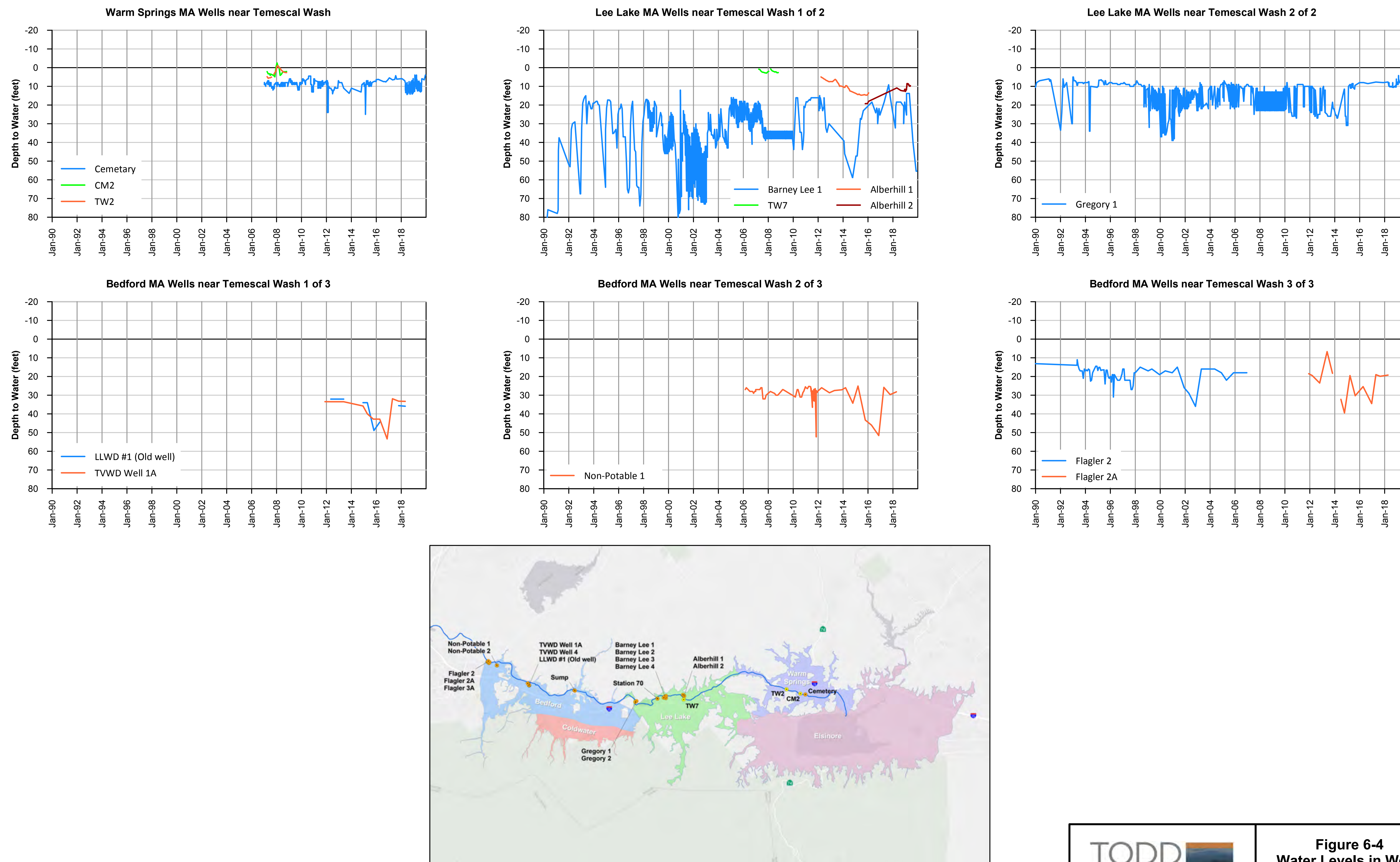


Note:
The Warm Springs and Lee Lake areas in the upper chart are outside the Bedford-Coldwater Basin. These are portions of the Elsinore Subbain upstream of the Bedford-Coldwater Basin.

TODD GROUNDWATER

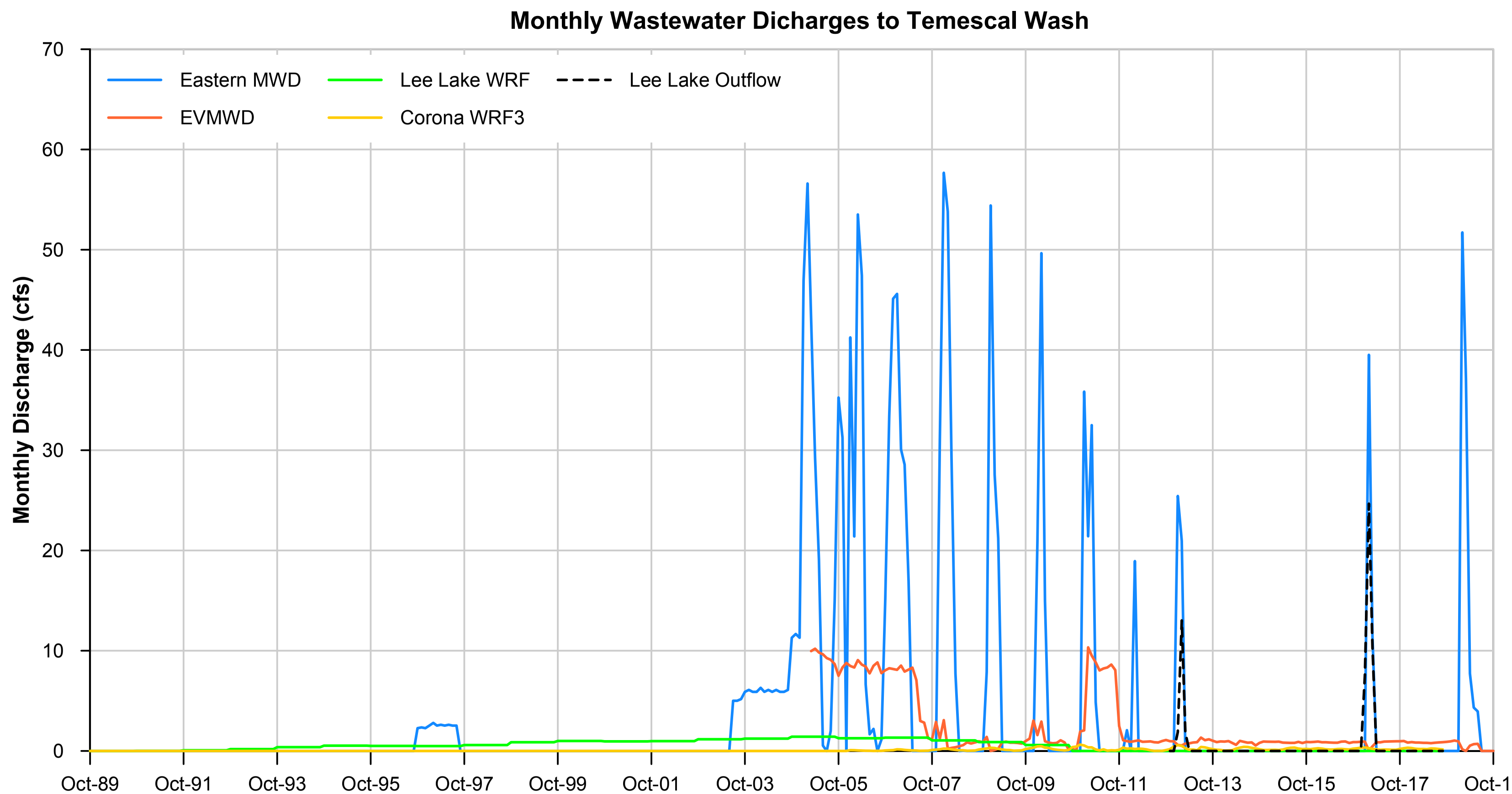
Figure 6-3
Annual Groundwater Pumping Near Temescal Wash, 1990-2018

Path: T:\Projects\Bedford Coldwater GSP 80802\GRAPHICS\Figure 6-3 Annual Groundwater Pumping near Temescal Wash, 1990-2018.gpj



TODD GROUNDWATER

Figure 6-4
Water Levels in Wells Near Temescal Wash



TODD GROUNDWATER

Figure 6-5
Wastewater Discharges to Temescal Wash
1989-2019

7. MONITORING NETWORK

The overall objective of the monitoring network for this Groundwater Sustainability Plan (GSP) is to yield representative information about water conditions in the Bedford-Coldwater Subbasin (Basin) as necessary to guide and evaluate GSP implementation. Specifically, monitoring network objectives are to:

- Build on the existing monitoring network data to represent the entire Basin,
- Reduce uncertainty and provide better data to guide management actions, document the water budget, and better understand how the surface water/groundwater system works,
- Monitor groundwater conditions relative to sustainability criteria, and
- Identify and track potential impacts on groundwater users/uses and better communicate the state of the Basin.

With the intent to provide sufficient data for demonstrating short-term, seasonal, and long-term trends in groundwater and related surface conditions, this GSP builds on existing monitoring programs (summarized in Chapter 2, Plan Area) that provide historical information and a context for monitoring. Data gaps are addressed in terms of information needed for understanding the basin setting, evaluation of the efficacy of Plan implementation, and the ability to assess whether the Basin is being sustainably managed.

This GSP Section describes the monitoring network as enhanced to fulfill Sustainable Groundwater Management Act (SGMA) requirements and explains how it will be implemented. This includes description of the monitoring protocols for data collection, the development and maintenance of Bedford-Coldwater Groundwater Sustainability Agency (BCGSA) data management system (DMS), and the regular assessment and improvement of the monitoring program.

7.1. DESCRIPTION OF MONITORING NETWORK

The monitoring network for GSP implementation has been established to document groundwater and related surface conditions as relevant to the sustainability indicators: groundwater levels, storage, land subsidence, water quality, and interconnected surface water[7]. The components of the monitoring network are presented in **Table 7-1**.

[7] Seawater intrusion is noted, but no risk of seawater intrusion exists in this inland basin.

Table 7-1. Bedford Coldwater Monitoring Network Summary

Monitored Variable	Type of Measurement	Locations	Data Interval	Data Collection Agency	Database Storage Agency	Notes
Groundwater levels						
Bedford-Coldwater Basin	Depth to water, feet	17 monitored wells (see Table 6-1), plus two new dedicated monitoring wells	Continuous to Annual	City of Corona, Elsinore Valley Water District (EVMWD), and Temescal Valley Water Disrict (TVWD)	Bedford-Coldwater Groundwater Sustainability Agency (BCGSA)	Data from all sources compiled into unified groundwater elevation database. Continuous data recorded with and on data logging transducers.
Groundwater storage						
Rainfall	Rain gauge, daily total, inches	Lake Elsinore, Santiago Peak, and Riverside	Daily and Monthly	NOAA, Orange County, and UC Riverside CIMIS	BCGSA	Download from web annually for annual water budget and model update
Rainfall (Interpolated)	Interoplated spatially from point data	Basin-wide		PRISM Climate Group	BCGSA	Rainfall gauges are not within the basin, and PRISM data helps interpolate in regions with climatic variation
Reference ET (ET_0)	Daily ETo, inches	Lake Elsinore and Riverside	Daily	NOAA, UC Riverside CIMIS	DWR	Download from web
Stream flow	Daily average flow, cfs	Three active USGS gages near Beford-Coldwater Basin	Daily	USGS	USGS	Download from web
Wastewater pond water budgets	WWTP effluent discharge, evaporation, percolation, AF	Corona and TVWD	Monthly	Corona and TVWD	BCGSA	
Recycled water use	Recycled water delivery, AF	Basin-wide	Monthly	Corona and TVWD	BCGSA	Recycled water use is a relatively small but increasing supply
Imported Water	Volume imported water AF	Imported to Bedford Colwater	Monthly	Corona, EVMWD, and TVWD	BCGSA	
Land Use Maps	Maps of Land Use	Basin-wide		DWR (2014, 2016, and future) and Riverside County (1993 and 2000)	DWR and Riverside County	DWR data is statewide, remotely sensed, and includes agriculture by crop
Municipal Water Use	Metered water use by sector	EVMWD, Corona, and TVWD	Monthly	Corona, EVMWD, and TVWD	BCGSA	Annual data reported in by BCGSA agencies and to Western Municipal Water District as Watermaster for the watershed, includes imported, groundwater, and recycled water use
Groundwater pumping						
Community Water Systems	Estimated	Basin-wide	Annual	Santa Ana Watermaster	BCGSA	Annual estimates provided in water budget updates of Annual Report
Groundwater Production	Annual Volume, AFY	Basin-wide	Annual	Santa Ana Watermaster, Corona, EVMWD, and TVWD	Western Municipal Water District as Watermaster and BCGSA	Annual data for all pumpers reported to Santa Ana Watermaster, monthly production data for BCGSA agencies availble from those agencies.
Rural domestic, commercial, industrial	Estimated	Basin-wide	Annual	Santa Ana Watermaster, Corona, EVMWD, and TVWD	BCGSA	Annual estimates provided in water budget updates of Annual Report
Subsidence						
Subsidence	InSAR satellite mapping of ground displacement	Basin-wide	Annual change	DWR (InSAR)	DWR SGMA Data Portal	Download annually, smooth InSAR raster datasets, compare cumulative elevation change since 2015 against Minimum Threshold criterion.
Groundwater quality						
Groundwater Quality	Major and minor ions and contaminants	14 monitored wells	Quarterly/ Semi-annual	Corona, EVMWD, TVWD, SWRCB GAMA , DDW, RWQCB	BCGSA	Wells with water qualtiy data may be added or removed over time
Interconnected Surface Water and GDEs						
Groundwater Depth to Water	Depth to water, feet	8 monitored wells	Continuous to Annual	Corona, EVMWD, and TVWD	BCGSA	Measurements are sparse, but groundwater in some areas may be shallow enough to support riprarian vegetation

7.1.1. Chronic Lowering of Groundwater Levels

As described in Plan Area Section 2, 19 wells in the Basin with elevation data are monitored by the BCGSA or its member agencies. **Figure 7-1** shows the 19 wells that will be part of the groundwater level monitoring program. Of these 17 have been actively monitored within the past five years and 2 new wells (BCGSA MW-1 and MW-2) are being installed as part of GSP development. The new wells are currently being installed and are expected to be part of the network by 2022. Their planned locations are shown on **Figure 7-1**. The distribution of existing monitoring wells is uneven, with most monitoring wells clustered in the Coldwater Management Area (MA) and along the Temescal Wash in the Bedford MA. The new monitoring wells were designed to fill key data gaps in the northwestern portion of the Basin and to monitor water levels related to the potential effects of the Glen Ivy Fault. All the wells in the GSP monitoring network are listed in **Table 7-2** and will continue to be monitored by the BCGSA or its member agencies. (Glen Ivy Well 1 also is listed as a planned water quality monitoring well).

Data for GSP implementation collected by the BCGSA and/or its member agencies will be compiled by the BCGSA into the DMS developed as part of the GSP. Benefits of these efforts will accrue over the next few years and will support review and update of the monitoring program in the 2027 Five-Year GSP Update. Additional groundwater elevation data from previous investigations may be used to supplement the current monitoring program.

7.1.1.1. Spatial and Vertical Coverage

Figure 7-1 shows locations of wells in the groundwater level monitoring program, while **Table 7-2** provides a summary of relevant monitoring wells. All monitoring wells are owned by the City of Corona (Corona), Elsinore Valley Municipal Water District (EVMWD), and Temescal Valley Water District (TVWD).

Well density has been a consideration in identifying new dedicated monitoring well sites and adding existing wells to the monitoring program. California Department of Water Resources (DWR) guidance (DWR 2016d) generally recommends a monitoring well density of 4 wells per 100 square miles (mi^2), which would equate to 0.44 wells for the 11 mi^2 Basin. The BCGSA monitoring program is consistent with this guidance. Many of the active wells are clustered in the Coldwater MA.

Data on vertical groundwater gradients generally are lacking, as discussed in the Hydrogeologic Conceptual Model, Section 3. Vertical gradients also have not been distinguished because most monitoring data are from public supply wells, which generally have long screen zones and have not been designed to assess or monitor vertical gradients in the Basin.

7.1.1.2. Monitoring Frequency

SGMA and the California Statewide Groundwater Elevation Monitoring (CASGEM) program require collection of static groundwater elevation measurements at least two times per year to represent seasonal low and seasonal high groundwater conditions. Currently, the 17 water level wells are monitored at least quarterly, and most are monitored either monthly or continuously. Data logging transducers have been installed for measuring groundwater elevation data in most of the groundwater monitoring wells. These transducers collect water level measurements at least monthly, and data are either transmitted to data collection and operation systems or downloaded quarterly.

7.1.2. Reduction of Groundwater in Storage

As described in GSP Section 6.3, groundwater level Minimum Thresholds (MTs) are used as a proxy metric for groundwater in storage. Accordingly, the monitoring of groundwater levels described above in Section 7.1.1 also pertains to tracking sustainability for groundwater in storage.

In addition, GSP regulations require annual evaluation and reporting of change in groundwater in storage.

For the GSP, the numerical groundwater model has been used to quantify the water budget and change in storage (see Water Budget, Chapter 5) using available information from the Monitoring Well Network. The numerical model (described in **Appendix E**) fulfills data and reporting standards described in Title 23 of the California Code of Regulations (CCR), Section 352.4.

As described in Plan Area Section 2.1.4.1 and summarized in **Table 7-1**, the BCGSA monitoring program provides information needed to update the water budget and assess annual change in groundwater storage. This program compiles and reviews information on climate (rainfall and evapotranspiration), stream flow, imported water deliveries, wastewater percolation and water recycling, and groundwater pumping (municipal, industrial, and other). Groundwater in storage will be assessed annually by estimating storage changes as the product of groundwater level change (feet), basin area (acres) and storativity values for each MA.

7.1.2.1. Spatial Coverage

Evaluation of change in groundwater in storage involves several of the monitored variables listed in **Table 7-1**; monitoring locations are described in the table. **Table 7-1** identifies climate stations and stream gage locations. While the closest climate stations and stream gages are located outside the Basin, they are still sufficient to provide information about local conditions.

7.1.2.2. Surface Water Monitoring

There are three active stream flow monitoring gages near the Basin. These gages are monitored by the United States Geological Survey (USGS). Data from these gages will continue to be collected by the BCGSA.

7.1.2.3. Monitoring Frequency

Table 7-1 describes the data interval for the monitored variables that contribute to evaluation of groundwater in storage. Groundwater in storage will be assessed annually using the numerical model, which will be recalibrated during each five-year GSP update.

7.1.3. Seawater Intrusion

There is no monitoring for seawater intrusion and no gaging of tidal influence. The Basin is located over 20 miles inland from the Pacific Ocean, and its lowest elevations are around 1,000 feet above sea level. No risk of seawater intrusion exists in the Basin given its location and therefore no monitoring is needed.

7.1.4. Subsidence

The monitoring program will review Interferometric Synthetic Aperture Radar (InSAR) satellite-based data to identify and evaluate land subsidence in the Basin (see **Table 7-1**). These data will be used to monitor the rate and extent of ground surface elevation change as applicable and with reference to the MT and Measurable Objective (MO), which are described in Sustainability Criteria Sections 6.4. These data represent measurements of ground surface displacement and thus are directly applicable to scientific assessment of potential subsidence.

7.1.4.1. Spatial Coverage

The InSAR data provide adequate coverage of the Bedford Coldwater Basin including both MAs, as described in Groundwater Conditions Section 4.3 and Sustainability Criteria Section 6.4. InSAR data are available for the entire Basin (and beyond), as shown with recent InSAR information from DWR on **Figure 4-10**. InSAR data will be cross-checked, and in conjunction with local groundwater level and pumping data will be used to assess relationships between groundwater levels, pumping, and subsidence data.

7.1.4.2. Monitoring Frequency

Assuming continued data availability, the monitoring program will involve annual download of InSAR data with analysis for any signs (rate and extent) of cumulative inelastic subsidence. To date there have been no reports or other indications of subsidence in the Basin. While data will be reviewed annually, at this time detailed analysis relative to the Minimum Threshold and Measurable Objective is planned as part of the five-year GSP update. The reporting will be consistent with GSP Regulations.

7.1.5. Degraded Water Quality

In addition to the general monitoring objectives listed above, specific objectives for the GSP water quality monitoring program include the following:

- Collect groundwater quality data from the principal aquifer to identify and track trends of any water quality degradation,
- Map the movement of degraded water quality,

- Define the three-dimensional extent of any existing degraded water quality impact,
- Assess groundwater quality impacts to beneficial uses and users, and
- Evaluate whether management activities are contributing to water quality degradation.

Figure 7-2 shows the location of the existing wells that are sampled for water quality. The existing water quality monitoring programs for the Basin are described in Plan Area Section 2.1.4, Groundwater Conditions Section 4, and Sustainability Criteria Section 6.6. To summarize, the BCGSA monitoring program relies on other agencies and their annual or semi-annual measurements, including Corona, EVMWD, TVWD, the Santa Ana Regional Water Quality Control Board (RWQCB), and State Water Resources Control Board Division of Drinking Water (SWRCB-DDW). The BCGSA agencies currently monitor 12 wells periodically for general minerals, physical parameters, and selected constituents of concern. In addition, one private well (Glen Ivy Hot Springs) is sampled regularly, and water quality data are provided to the SWRCB-DDW. Two new dedicated monitoring wells will be added to the monitoring network as part of GSP development. These wells (BCGSA MW-1 and MW-2) are shown on **Figure 7-2**. As described in Groundwater Conditions Section 4 and discussed in depth in Section 6.6, a broad suite of inorganic constituents is sampled and analyzed and known regulated contamination sites are tracked. Total dissolved solids (TDS) and nitrate have been identified as the key constituents of concern for which sustainability criteria have been defined.

7.1.5.1. Spatial and Vertical Coverage

The current monitoring network in the Basin contains spatial and vertical gaps. **Figure 7-2** shows the spatial distribution of wells currently monitored, including the new dedicated monitoring wells that will be sampled regularly.

As with the groundwater level monitoring program, existing wells in the BCGSA groundwater quality monitoring program will be evaluated relative to 23 CCR § 352.4 requirements for well information. The new dedicated monitoring wells are designed to meet requirements while addressing data gaps in the water quality monitoring program as well as the water level monitoring program.

Vertical coverage is discussed in Groundwater Conditions Section 4.9, which indicates that the water quality monitoring programs in the Basin do not reveal vertical differences in water quality. Otherwise, vertical differences in water quality are uncertain; this reflects the fact that most monitored wells are pumping wells with long screens.

As stated in Section 6.6, the BCGSA will continue to improve and expand the monitoring program if needed to address spatial and vertical coverage.

7.1.6. Depletion of Interconnected Surface Water

The minimum threshold for depletion of interconnected surface water is defined by groundwater levels monitored near dense riparian vegetation along the Temescal Wash. At this time, wells in the groundwater level monitoring program are production wells with relatively deep screens that have not been sited and designed for tracking surface water-groundwater interactions. The lack of shallow monitoring wells has been identified as a data gap.

7.1.6.1. Spatial and Vertical Coverage

Figure 7-1 is a map showing locations of key wells currently selected for groundwater levels and those located along selected stream reaches can be used to monitored groundwater-surface water interaction. The identification of key stream reaches is described in Sustainability Criteria Section 6.7 and has addressed all management areas. **Table 7-2** provides a summary of the monitoring wells in the network.

The scientific rationale for identification of wells for inclusion in the shallow groundwater level monitoring program has involved the following:

- Location adjacent to riparian vegetation along Temescal Wash.
- Length, completeness, and reliability of historical groundwater level record with measurements.
- Regular access to the well for measurements.

The selected wells are all water supply wells with relatively deep screens and therefore do not provide the needed vertical (shallow) coverage. The BCGSA will investigate the connection between shallow groundwater, surface water, and riparian vegetation as indicated in Section 8, Projects and Management Actions. These investigations will focus on identifying the need for additional shallow groundwater monitoring near areas of interconnected surface water.

7.1.6.2. Temporal Coverage and Monitoring Frequency

The monitoring for groundwater levels adjacent to areas of riparian vegetation in Temescal Wash will be implemented as part of the overall groundwater level monitoring program as described in Section 7.1.1. Monitoring of existing wells in the program will be continued, serving as the Key Wells for monitoring relative to the Minimum Thresholds defined in GSP Sustainability Criteria Section 6. Once sited and installed, the periods of record for new dedicated shallow wells will be established. Groundwater level data will be reviewed annually (for each annual report) with reference to the Minimum Threshold. Detailed analyses of the relationships among deep and shallow groundwater level data, stream flow, and riparian conditions will be provided in the Five-Year Update (or sooner if extreme drought conditions and riparian mortality occur; see GSP Section 6.7).

7.2. PROTOCOLS FOR DATA COLLECTION AND MONITORING

This section focuses on groundwater level monitoring (including regional and surface water-oriented) and groundwater quality sampling by BCGSA. Other data (e.g., climate, streamflow, municipal pumping, subsidence) are compiled by other agencies.

This section describes general procedures for documenting wells in the monitoring program and for collecting consistently high-quality groundwater elevation and groundwater quality data. In general, the methods for establishing location coordinates (and reference point elevations for elevation monitoring) follow the data and reporting standards described in the GSP Regulations (23 CCR § 352.4) and the guidelines presented in USGS Groundwater Technical Procedures (Cunningham and Schalk 2011 and USGS 2021). These procedures are summarized below.

7.2.1. Field Methods for Monitoring Well Data

Background data for each monitoring well is required for its inclusion in the monitoring program. These data are generally available for wells in the network described on **Table 7-2** and shown on **Figures 7-1**. As part of GSP implementation, location and elevation data will be acquired where missing, revised if conditions at a monitored well change, and added when new wells are brought into the program. The methods for acquiring these data follow:

- Location coordinates will be surveyed with a survey grade global positioning system (GPS) device. The coordinates will be in Latitude/Longitude decimal degrees and reference the North American Datum of 1983 (NAD83) datum.
- Reference point elevations will also be surveyed with a survey grade GPS device with elevation accuracy of approximately 0.5 feet.
    - During surveying, the elevations of the reference point and ground surface near the well will be measured to the nearest 0.5 foot.
    - All elevation measurements will reference North American Vertical Datum of 1988 (NAVD88) vertical datum.

7.2.2. Field Methods for Groundwater Elevation Monitoring

Reference points and ground surface elevations will be documented as described above prior to groundwater elevation monitoring in the field. Field methods for collection of depth-to-water measurements are described below:

1. Measurements in all wells will be collected within a three-day window whenever possible.
2. Active production wells should be turned off prior to collecting a depth to water measurement.
3. The standard period of time that a well needs to be off before a static measurement is taken is at least 24 hours (48 hours recommended).
4. To verify that the wells are ready for measurement, BCGSA field staff will coordinate with well operators and/or owners as necessary.
5. Coordination with well operators/owners should occur approximately four days prior to the expected measurement date.
6. Depth to groundwater measurements collected by either electric sounding tape (Solinst or Powers type sounders), by steel tape methods, or data logging transducers. Depth-to-water measurement methods are described in DWR's

Groundwater Elevation Monitoring Guidelines (DWR 2010). Depth to groundwater will be measured and reported in feet to at least 0.1 foot.

7.2.3. Field Methods for Groundwater Quality Monitoring

Groundwater sampling is conducted by trained professionals from the three agencies in the BCGSA or specialty contractors. Sampling follows standard monitoring well sampling guidelines such as those presented in the National Field Manual for the Collection of Water-Quality Data (USGS 2021).

Generally, the wells have been pumped prior to sample collection, or are purged. Purging is conducted until field instruments indicate that water quality parameters (pH, oxidation-reduction potential (ORP), specific conductance, and temperature) have stabilized and turbidity measurements are below five Nephelometric Turbidity Unit (NTUs). The pumping or purging prior to sample collection demonstrates that the sample collected is representative of formation water and not stagnant water in the well casing or well filter pack. For groundwater, field temperature and conductivity are recorded while the well is being purged to ensure that physical parameters have stabilized before collecting a sample.

All groundwater samples are collected in laboratory-supplied, pre-labeled containers and include prescribed preservatives. The filled sample containers will then be placed in an ice-filled cooler for storage and transported to the laboratory for analysis under chain of custody procedures.

All field measurements are recorded in a field logbook or worksheets and the sample containers are labeled correctly and recorded on the chain-of-custody form. The applicable chain-of-custody sections are completed and forwarded with the samples to the laboratory. Upon receipt of the samples at the laboratory, laboratory personnel complete the chain-of-custody.

Quality assurance and quality control (QA/QC) assessment of field sampling includes use of field blanks. Field blanks identify sample contamination that is associated with the field environment and sample handling. These samples are prepared in the field by filling the appropriate sample containers with the distilled water used for cleaning and decontamination of all field equipment. One field blank per sampling event is collected.

Samples are sent to a State-certified laboratory that has a documented analytical QA/QC program including procedures to reduce variability and errors, identify and correct measurement problems, and provide a statistical measure of data quality. The laboratory conducts all QA/QC procedures in accordance with its QA/QC program. All QA/QC data are reported in the laboratory analytical report, including: the method, equipment, and analytical detection limits, the recovery rates, an explanation for any recovery rate that is less than 80 percent, the results of equipment and method blanks, the results of spiked and surrogate samples, the frequency of quality control analysis, and the name of the person(s) performing the analyses. Sample results are reported unadjusted for blank results or spike recovery.

7.3. REPRESENTATIVE MONITORING

To allow quantification and tracking of sustainability criteria, representative monitoring sites, or wells, have been identified for 1) regional groundwater level monitoring and 2) for monitoring shallow groundwater conditions where surface water-groundwater connection is likely and tied to groundwater dependent ecosystems (GDEs). These Key Wells are shown on **Figure 7-1** and listed in **Table 7-2**. These have been designated by BCGSA as the point at which sustainability indicators are monitored. Information on the quantitative values for MTs, MOs, and interim milestones is included in Sustainability Criteria Section 6.

As discussed in Sustainability Criteria Section 6.3, change in groundwater in storage is closely related to groundwater levels, which can serve as a proxy for monitoring change in storage. Moreover, groundwater level MTs and MOs are sufficiently protective to ensure prevention of significant and unreasonable results relating to storage. Accordingly, continued monitoring of wells for groundwater levels also serve to track sustainability for storage.

As discussed in Section 6.4, the definition of undesirable results and the quantification of the MT and MO for subsidence are based on InSAR information on vertical displacement of the ground surface; these spatial and temporal data are publicly available from DWR.

Section 6.5 discusses seawater intrusion, which is not possible in this inland basin.

Section 6.6 describes undesirable results and defines sustainability criteria for water quality. MTs and MOs are quantified in terms of the percentage of wells with concentrations exceeding the local and state goals for nitrate and TDS based on current conditions. The BCGSA water quality monitoring wells shown on **Figure 7-2** and listed in **Table 7-2** are sampled regularly to identify water quality problems and to track water quality trends.

Table 7-2. Wells in the Bedford-Coldwater Groundwater Sustainability Agency Monitoring Network

Local Well Name	State Well Number	CASGEM Identification Number	Well Owner	Production Well	Management Area	X Coordinate (feet State Plane CA Zone 6, NAD 83)	Y Coordinate (feet State Plane CA Zone 6, NAD 83)	Ground Surface Elevation (feet)	Reference Point Elevation (feet)	Completion Date	Total Well Depth (feet)	Screen Interval Depths (feet)	Water Level Monitoring Well (Yes/No)	Surface Water Monitoring Well (Yes/No)	Water Quality Monitoring Well (Yes/No)
Corona Well 20	005S006W11D001	Not Applicable	City of Corona	Yes	Coldwater	6,187,462.780	2,220,777.903	1,147.58	1,149.48	10/2/1998	660	200 to 580	Yes	No	Yes
Corona Well 21	005S006W03J005	Not Applicable	City of Corona	Yes	Coldwater	6,185,101.479	2,224,408.672	1,128.00	1,128.49	5/22/1998	660	200 to 580	Yes	No	Yes
Corona Well 3	005S006W03K001	Not Applicable	City of Corona	Yes	Coldwater	6,184,790.810	2,222,918.852	1,137.70	1,143.57	1/26/1935	543	100 to 530	Yes	No	No
Corona Non-Potable Well 1	004S006W16G004S	46729	City of Corona	Yes	Bedford	6,179,815.144	2,245,270.386	808.92	809.34	Unknown	Unknown	Unknown	Yes	Yes	Yes
Corona Non-Potable Well 2	004S006W16G005S	46730	City of Corona	Yes	Bedford	6,179,827.292	2,245,270.240	808.77	808.90	Unknown	Unknown	Unknown	Yes	Yes	Yes
Corona & EVMWD Trilogy	005S006W03H001S	Not Applicable	Corona & EVMWD	Yes	Coldwater	6,184,906.094	2,224,253.480	1,101.86	1,101.86	2/5/2016	579	250 to 360 and 390 to 450	Yes	No	No
EVMWD Flagler 2A Well	004S006W16C003S	46732	Elsinore Valley Municipal Water District	Yes	Bedford	6,179,006.482	2,247,223.539	791.71	796.96	3/30/2005	105	51 to 92	Yes	Yes	Yes
EVMWD Flagler 3A Well	004S006W16C002S	46733	Elsinore Valley Municipal Water District	Yes	Bedford	6,179,002.084	2,246,859.661	794.16	795.72	3/18/2005	100	51 to 90	Yes	Yes	Yes
EVMWD Station 71	005S006W11C001	Not Applicable	Elsinore Valley Municipal Water District	Yes	Bedford	6,187,370.000	2,222,025.759	1,166.45	1,168.53	7/22/1971	600	239 to 588	Yes	No	Yes
EVMWD Mayhew Well 2	005S006W11G001	Not Applicable	Elsinore Valley Municipal Water District	Yes	Coldwater	6,187,322.670	2,222,291.946	1,241.00	1,242.33	10/27/1989	740	300 to 730	Yes	No	Yes
TVWD Well 1 (Old well)	004S006W22P003S	Not Applicable	Temescal Valley Water District	No	Bedford	6,182,456.123	2,237,346.855	894.00	881.40	Unknown	100	40 to 80	Yes	Yes	No
TVWD Well 1A	Not Available	Not Applicable	Temescal Valley Water District	Yes	Bedford	6,182,464.822	2,237,273.854	895.00	882.68	Unknown	100	40 to 80	Yes	No	Yes
TVWD Well 4	004S006W22P004S	Not Applicable	Temescal Valley Water District	Yes	Bedford	6,182,523.828	2,237,795.159	883.00	878.97	Unknown	100	40 to 80	Yes	Yes	Yes
TVWD TP-1	Not Available	Not Applicable	Temescal Valley Water District	Yes	Bedford	6,183,364.598	2,235,315.457	901.46	902.29	6/18/2015	103	39 to 99	Yes	Yes	Yes
TVWD TP-2	Not Available	Not Applicable	Temescal Valley Water District	Yes	Bedford	6,183,683.778	2,235,349.830	902.37	902.62	5/18/2017	90	30 to 85	Yes	Yes	Yes
TVWD Foster Well	004S006W22N002	Not Applicable	Temescal Valley Water District	Yes	Bedford	6,182,288.775	2,238,133.791	871.74	872.94	6/9/2015	93	38 to 88	Yes	No	Yes
TVWD New Sump	004S006W35G002	47928	Temescal Valley Water District	Yes	Bedford	6,189,460.269	2,229,866.527	955.71	953.57	Unknown	74	Unknown	Yes	No	Yes
BCGSA MW-1	Not Available Yet	Not Applicable	Bedford-Coldwater GSA	No	Bedford	6,181,386.544	2,228,000.186	Not Available Yet	Not Available Yet	Construction Planned Mid-2021	Not Available Yet	Not Available Yet	Yes	No	Yes
BCGSA MW-2	Not Available Yet	Not Applicable	Bedford-Coldwater GSA	No	Coldwater	6,181,488.573	2,231,333.213	Not Available Yet	Not Available Yet	Construction Planned Mid-2021	Not Available Yet	Not Available Yet	Yes	No	Yes
Glen Ivy Well 1	Not Available	Not Applicable	Glen Ivy Hot Springs	Yes	Coldwater	6,183,187.330	2,221,453.024	Unknown	Unknown	Unknown	Unknown	Unknown	No	No	Yes

7.4. DATA MANAGEMENT SYSTEM (DMS)

The BCGSA has been collecting and compiling groundwater data including water levels, water quality, and water use for the GSP. Before the creation of the GSA, the individual agencies of the BCGSA (Corona, EVMWD, and TVWD) monitored water levels and water quality independently. These data from other sources are compiled in relational databases, which consists of Access databases and ESRI geodatabases that have the capabilities for queries to quickly check and summarize data. As part of the GSP, the DMS has been modified to be practicable, usable, and intuitive for the purpose of GSP preparation and implementation. **Appendix I** details the final DMS. The databases include easy to update tables and other datasets that assist in comparison of real time conditions and sustainability goals.

7.5. ASSESSMENT AND IMPROVEMENT OF MONITORING NETWORK

The BCGSA has actively engaged in assessment and improvement of its monitoring network. This process has been intensified as part of the GSP, given the need to identify data gaps and to assess uncertainty in setting and tracking sustainability criteria. Monitoring improvements are a major part of GSP implementation and will be reviewed and updated for each five-year GSP update.

7.5.1. Identification and Description of Data Gaps

The limited data gaps that have been identified in this GSP are summarized in **Table 7-3** according to major monitored variable and described in terms of insufficient number of monitoring sites and utilization of monitoring sites that are unreliable (including those that do not satisfy minimum standards). Data gaps also are described in terms of the location and reason for data gaps in the monitoring network, and local issues and circumstances that limit or prevent monitoring. Data gaps listed in **Table 7-3** do not include gaps in understanding, which build on the monitoring network but also require investigation and analysis. These planned studies are described as Management Actions in GSP Chapter 8.

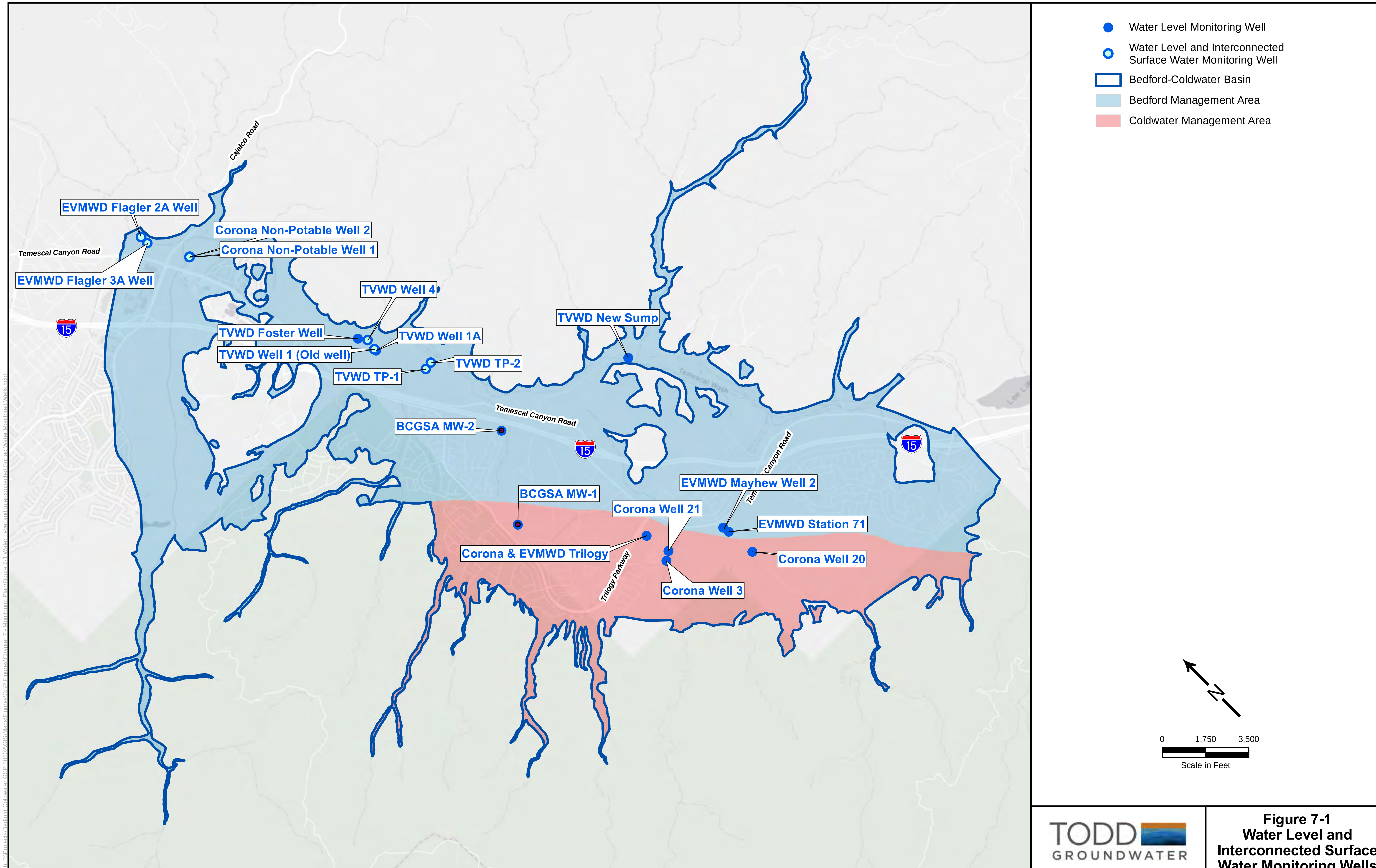
Table 7-3. Identification and Description of Data Gaps

Monitored Variable	Insufficient Sites	Local Issues
Regional Groundwater levels	No	The water level network has historically relied on production wells, but new dedicated wells have been installed and the production wells are well suited to monitoring conditions related to water supply for municipal, industrial, and other beneficial uses.
Stream flow	No	
Groundwater extraction	No	Most pumping is reported; there may be unreported pumping but it is assumed to be de minimis.
Groundwater quality	No	Water quality sampling in the Basin is typically tied to regulatory requirements. The BCGSA will perform regular monitoring of the well network and collect water quality data from all available sources.
Shallow groundwater levels	Yes	No shallow dedicated groundwater monitoring wells in Basin. Long well screens in monitoring wells limit vertical groundwater quality characterization.

7.5.2. Description of Steps to Fill Data Gaps

Monitoring data gaps have been identified for shallow groundwater level measurements.

Additional shallow groundwater level monitoring is required to better monitor interconnected surface water and GDEs in the Basin. The management actions the BCGSA will undertake towards filling this data gap are described in Section 8, Projects and Management Actions.



TODD GROUNDWATER

Figure 7-1
Water Level and Interconnected Surface Water Monitoring Wells

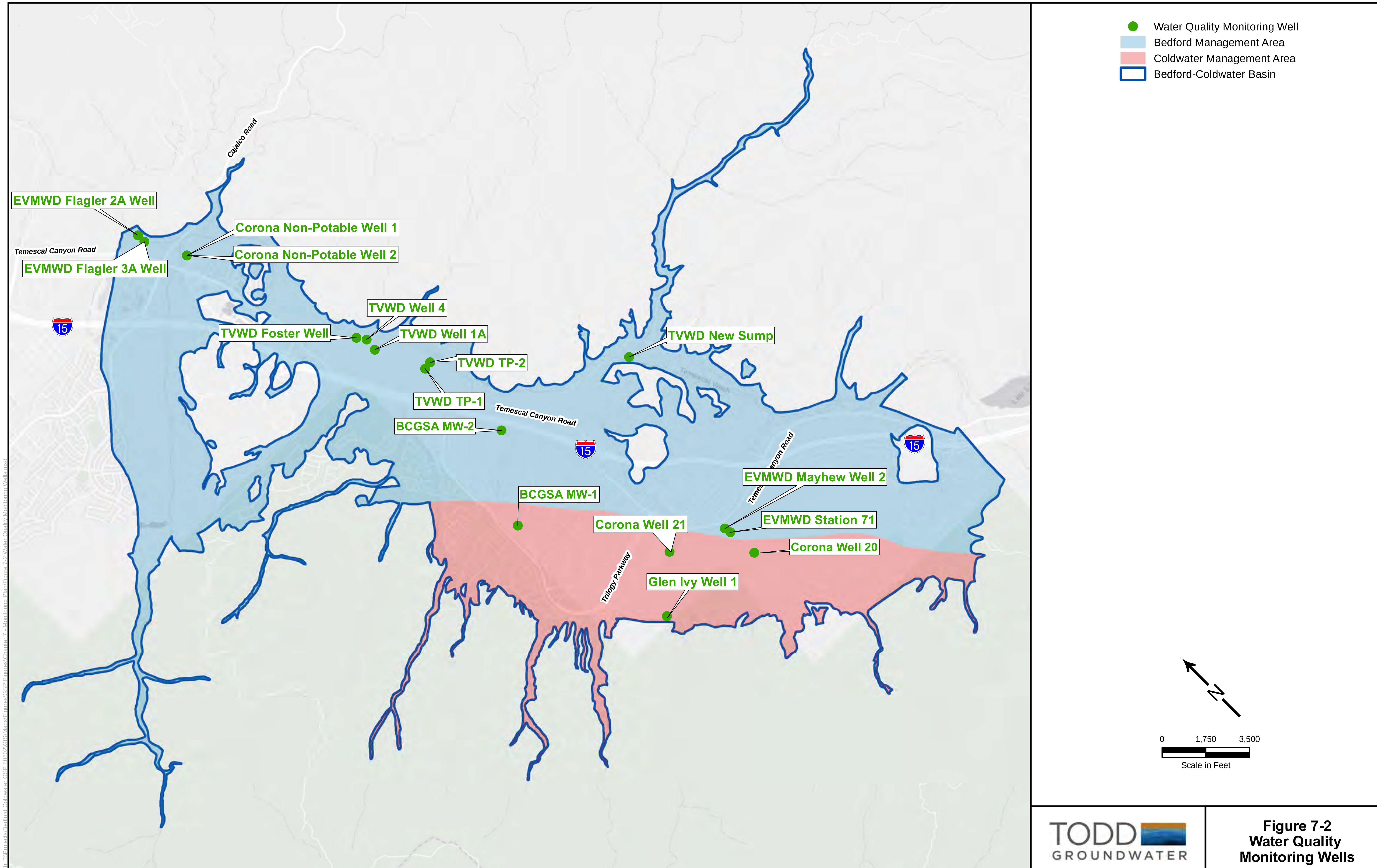


Figure 7-2 Water Quality Monitoring Wells

8. PROJECTS AND MANAGEMENT ACTIONS

During the preparation of the Groundwater Sustainability Plan (GSP) for the Bedford-Coldwater Subbasin (Basin), five (5) specific management actions (Actions) and three (3) projects (Projects) were identified to achieve the sustainability goal. The Actions are generally focused on data collection, storage and reporting of information necessary to monitor sustainability, and assessment of when Actions may be necessary (i.e., when minimum thresholds (MTs) are approached or exceeded). The projects are generally designed to reduce uncertainty in areas where data gaps have been identified during development of the GSP.

The Projects and Actions will be implemented by a combination of personnel resources from the three agencies within the plan area (Elsinore Valley Municipal Water District [EVMWD], City of Corona [Corona], and Temescal Water District [TVWD]) and contracted resources as described in Section 9. The Projects and Actions in the GSP are as follows:

- **Action 1** – Provide for Collection, Compilation, and Storage of Information Required for Annual Reports and Submit Annual Reports;
- **Action 2** – Routinely Record Groundwater Levels and Take Action if Necessary;
- **Action 3** – Monitor Selected Groundwater Quality Constituents and Coordinate with the Regional Water Quality Control Board as Appropriate;
- **Action 4** – Track Trends in Groundwater Levels near Temescal Wash and Take Action as Necessary;
- **Action 5** – Review Interferometric Synthetic Aperture Radar (InSAR) Data on the California Department of Water Resources (DWR) DataViewer During 5-Year Updates;
- **Project 1** – Investigate Groundwater/Surface Water Interaction at Temescal Wash;
- **Project 2** – Initiate a Survey of Active Private Wells; and
- **Project 3** – Evaluation of the Effects of Aggregate Pits on Groundwater Flow and Quality.

The Projects and Actions are described in the following sections. Further details regarding each project and management action are summarized in **Table 8-1** through **Table 8-8** at the end of this section. A periodic 5-year update of the GSP is described in Chapter 9.

8.1. ACTION 1 – PROVIDE FOR COLLECTION, COMPILATION, AND STORAGE OF INFORMATION REQUIRED FOR ANNUAL REPORTS AND SUBMIT ANNUAL REPORTS

The Sustainable Groundwater Management Act (SGMA) requires Groundwater Sustainability Agencies (GSAs) to submit annual reports to DWR each April 1st following adoption of a GSP. The report provides information on groundwater conditions and the status of implementation of the GSP over the prior water year. Action 1 will facilitate gathering the required information and producing the annual report (with the exception of collecting and compiling water levels, which is facilitated under Action 2).

As required by Title 23 of the California Code of Regulations (CCR), Section 356.2, the annual report produced by the Bedford-Coldwater GSA (BCGSA) will include the following components for the preceding water year:

(a) General information, including an executive summary and a location map depicting the Basin.
(b) A detailed description and graphical representation of the following conditions of the Basin:
    (1) Groundwater elevation data from monitoring wells identified in the monitoring network and collected as part of Action – 2 will be analyzed and displayed as follows:
        (A) Groundwater elevation contour maps for the principal aquifer in the Basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.
        (B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.
    (2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.
    (3) Surface water or imported water supply used or available for use, for groundwater recharge or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.
    (4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by water use sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data collection methods will be evaluated and modified as necessary as part of this Action.
    (5) Change in groundwater in storage shall include the following:
        (A) Change in groundwater in storage maps for each principal aquifer in the basin.
        (B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the Basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.
(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

Action 1 also provides for production and transmittal of the annual report described above.

8.2. ACTION 2 – ROUTINELY RECORD GROUNDWATER LEVELS AND TAKE ACTION IF NECESSARY

Each agency will collect static groundwater elevation data at the wells they own and operate. Depth to groundwater measurements will be collected at a minimum frequency of once per month, except in cases where a production well is active and shutting the well down to collect a static water level will cause operational problems due to interrupted supply. In these cases, quarterly measurements will be made. Several wells in the basin are monitored continuously via supervisory control and data acquisition (SCADA). In these cases, care will be taken to document the depth and elevation of the transducer, as well as the accuracy of the transducer, which can be expressed either as a percentage of full scale or in absolute terms. Depth to groundwater measurements from a known elevation under static (non-pumping) conditions using an electric probe will be periodically compared to transducer readings to determine the elevation of the transducer such that groundwater elevation hydrographs can be produced from SCADA records. The BCGSA administrator will be responsible for facilitating collection of groundwater elevation data in the proper format. Field methods for collection of depth to groundwater information are specified in Section 7.

The BCGSA administrator and each agency will note trends in depth to groundwater information, and agencies will coordinate to reduce pumping rates or durations if a trend toward the MT is observed. Agencies will curtail pumping in the affected area if a MT is reached.

8.3. ACTION 3 – MONITOR SELECTED GROUNDWATER QUALITY CONSTITUENTS AND COORDINATE WITH THE REGIONAL WATER QUALITY CONTROL BOARD AS APPROPRIATE

Each agency will collect groundwater samples at the wells they own and operate and deliver to a common laboratory for analysis. Field methods for collection of groundwater samples are specified in Section 7. Groundwater sampling results will be delivered to the BCGSA administrator who will compile and report results.

The BCGSA administrator will note trends in groundwater quality, and the BCGSA will coordinate with the Regional Water Quality Control Board as appropriate if a trend toward the MT is observed. The BCGSA administrator will be responsible for compiling groundwater quality data and adding it to the GSA Data Management System (DMS) in standardized format.

8.4. ACTION 4 – TRACK TRENDS IN GROUNDWATER LEVELS NEAR TEMESCAL WASH AND TAKE ACTION AS NECESSARY

Each agency will collect groundwater elevations at the wells they own and operate in the vicinity of Temescal Wash as described in Sections 6 and 7. Depth to groundwater measurements will be collected at a minimum frequency of once per month, except in cases where a production well is active and shutting the well down to collect a static water level will cause operational problems due to interrupted supply. Several wells in the Basin are monitored continuously via SCADA. SCADA records will be corrected for groundwater elevation as described in Section 8.2. Field methods for collection of depth to groundwater information are specified in Section 7.

The BCGSA administrator and each agency will note trends in depth to groundwater information, and agencies will coordinate to reduce pumping rates or durations if a trend toward the MT regarding interconnected surface water at Temescal Wash is observed. Agencies will curtail pumping in the affected area if an MT is reached.

8.5. ACTION 5 – REVIEW INSAR DATA ON THE DWR DATAVIEWER ANNUALLY AND COMPILE DURING 5-YEAR UPDATES

In other basins in California, extensive groundwater withdrawals from aquifer systems have caused land subsidence. Land subsidence can damage to structures such as wells, buildings, and highways. They also can create problems in the design and operation of facilities for drainage, flood protection, and water conveyance. Two factors generally needed for groundwater withdrawals to cause subsidence are 1) relatively large declines in groundwater levels combined with 2) relatively thick sequences of collapsible clays (such as ancestral lake deposits). Neither of these conditions exist in the Basin, and subsidence due to groundwater withdrawals has not been observed or expected. DWR has developed SGMA DataViewer to include updated subsidence information to help GSAs, water managers, and others to implement SGMA. The BCGSA will review the DataViewer information during the annual update and summarize the findings in the 5-year update.

8.6. PROJECT 1 – INVESTIGATE GROUNDWATER/SURFACE WATER INTERACTION AT TEMESCAL WASH

As noted in Section 6.7.8, there are several data gaps related to depletions of interconnected surface water along Temescal Wash. Data gaps include lack of water level data in certain areas, lack of dedicated monitoring (vs. production) wells, lack of wells within or near the wash channel, and uncertainty regarding vertical gradients. The objective of Project 1 is to address this data gap and improve protection of a potentially groundwater-dependent ecosystem (GDE) along Temescal Wash.

The BCGSA will develop a request for proposals (RFP) from qualified firms to conduct an initial study to evaluate the interaction of surface water and groundwater and the relationship of groundwater elevation on the health of riparian vegetation in Temescal Wash. The purpose of this study is to reduce uncertainty regarding the riparian habitat and ultimately to improve the MT and protect groundwater-dependent ecosystems. The study may involve field biological surveys, review of historical surface flows, review of historical photographs and remote sensing data, and investigation into evapotranspiration and root depth of riparian vegetation in and around Temescal Wash. It is anticipated that the work may result in recommendations for future monitoring protocols and permitting requirements for installation of piezometers or drive points close to the wash itself.

8.7. PROJECT 2 – INITIATE A SURVEY OF ACTIVE PRIVATE WELLS

As noted in Section 6, there are very few known active private wells in the Basin. Because there are records (DWR and other sources) of many more wells than are known to exist and be active, it is believed that most have been abandoned, destroyed, or are no longer equipped or used, as residential users have been connected to municipal water supplies. Known active private wells are for non-potable uses and are of similar depths and construction to the monitored municipal supply wells. During the recent drought, the Basin was not marked by reports of significant water level decline impacts to shallow production wells.

Nevertheless, there still remains some uncertainty about the existence, use, and construction characteristics of local, active, private (non-municipal) wells. For this reason, the BCGSA will initiate a survey of active private wells in order to confirm that the MTs are protective of the use of private wells being put to beneficial use.

8.8. PROJECT 3 – EVALUATION OF THE EFFECTS OF AGGREGATE PITS ON GROUNDWATER FLOW AND QUALITY

Significant aggregate (sand and gravel) resources mining occurs south of Corona within and along Temescal Wash and north of Lake Elsinore which has been active since the late 1940s (CDMG 1991). In 2007, the State of California reported that the active mines in local areas other than Temescal Valley are “nearly exhausted” and that the fast-growing county now relies on Temescal Valley for much of its aggregate needs. As a result, the Temescal Valley Production District has become the largest sand and gravel production district in the United States, having produced about 12 million tons of aggregate in 2005. Per a 2007 report issued by the California Geological Survey, the region’s 50-year aggregate demand is 1,122 million tons. As of 2007, a total of approximately 355 million tons were being supplied by permitted aggregate resources; 32 percent of the forecast demand. Data indicate that approximately 6,000 million tons of mineral resources are secured within the region (County of Riverside 2015).

Current surface mining permits (SMPs) include:

- SMP-133 (Coldwater Aggregates) which expires in 2040;
- SMP-139 (Mayhew Aggregates and Mining Reclamation) does not have an expiration date as an inert landfill site;
- SMP-143R2 (Foster’s Sand and Gravel) which expires in 2065; and
- SMP-202 (Chandlers Palos Verdes Sand and Gravel Company) which expires in 2036.

These permits note the ultimate use of the mining pits as stormwater recharge basins (KWC 2017), and therefore the mining pits will clearly have an impact on groundwater management (albeit at least 18 years into the future). The surface aggregate mining involves deepening and widening open pits as the mining operation expands. In doing so, the pits encounter groundwater. As groundwater levels rise and fall, the bottoms of the pits are exposed. Therefore, it is clear that there is communication between the surface water in the pits and the adjacent groundwater body which currently exists and will continue well into the future.

Groundwater modeling conducted as part of the GSP development (Section 5 and **Appendix E**) and groundwater sampling from wells near the pits suggest that the pits may have an effect on the local water budget and on groundwater quality in ways that are not completely understood. For example, model calibration efforts suggest consumptive use near the pits is higher than recorded pumping of adjacent wells, and the Corona Well 21 was shut down due to a high heterotrophic plate count (a measure of bacteria in water), potentially as a result of groundwater under the influence of surface water from the aggregate pits.

Therefore, to improve further modeling involving aggregate mines or simulation of proposed stormwater capture in the mines, a project is proposed to evaluate and improve the hydrogeologic conceptual model in the vicinity of the mines. The BCGSA will initiate the investigations after adoption of the GSP by issuing an RFP to qualified firms. Although details of the study of aggregate mining's effect on groundwater are yet to be determined, it is anticipated that the study may involve detailed review of the aggregate pit water budget (pumping, evapotranspiration, precipitation, and surface water flow infiltration), historical remote sensing images, historical hydrograph and streamflow information review, monitoring well construction, and/or interviews with local mine managers.

Table 8-1. Action 1 – Provide for Collection, Compilation, and Storage of Information Required for Annual Reports and Submit Annual Reports

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Routinely collect, compile, and store groundwater extractions by water use sector, groundwater extractions measurement methods and accuracy, surface water sources, and total water use and methods used to determine total water use. Prepare annual reports.	Collection of this information is required for annual reporting, but it will also assist in evaluation of trends and relationship to the sustainability of the management areas.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
Maintain groundwater elevations above the historical minimum elevation and maintain groundwater levels within the historical operating range.	The information will be collected by GSA agency personnel for the facilities (including wells) that they own and manage. This information will be transmitted to the a contracted GSA administrator on a monthly basis who will compile and store the information and complete annual reports. Information from private well owners which exceed de minimis levels will be compiled by the administrator.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
Information gathering will be implemented immediately upon GSP adoption.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$76,000 Annual cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
If overdraft is identified, the management action will be to curtail pumping as agreed upon by GSA staff.	The BCGSA will manage reductions in pumping rates or duration if trends indicate historical maximum groundwater levels will be reached. Individual agencies will be responsible for monitoring their wells and informing the BCGSA if this trend becomes apparent.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
No additional permitting or regulatory processes will be required.	The BCGSA Administrator will utilize BMPs and data formats specified by the DWR.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
Information gathering will be implemented immediately upon GSP adoption and will continue until the next 5-year update.	Level of uncertainty will be identified during the process of evaluating measurement methods and accuracy.

Table 8-2. Action 2 – Routinely Record Groundwater Levels and Take Action if Necessary

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Routinely measure and record water levels in selected wells identified in the monitoring plan. Monitor trends and reduce pumping if a trend toward a minimum threshold is observed. Curtail pumping in the event of reaching a minimum threshold.	Regular water level monitoring will benefit the maintenance of sustainability by decreasing the uncertainty regarding sustainable depths to groundwater in order to avoid undesirable results.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
Maintain groundwater elevations above the historical minimum elevation and maintain groundwater levels within the historical operating range.	Static groundwater levels will be collected and compiled by GSA agency personnel for the wells they own and manage at a minimum frequency of monthly. Transducers will be utilized where practical. This information will be transmitted to the GSA administrator who will compile and store the information and complete annual reports. In cases where active production wells are monitored, frequency may be reduced to quarterly to minimize water supply interruption.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
Water level monitoring will be implemented once the GSP is adopted. The minimum threshold is defined at each key well by either the depth to groundwater equivalent to the current pump intake or 10 feet above the bottom of the deepest screen section, whichever is shallower. Undesirable results are indicated when exceedances occur in two consecutive quarters in each of two consecutive years in at least two thirds of key wells in each management area. If a trend toward the minimum threshold is observed, pumping rates or durations will be reduced in the affected areas.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$110,000 Annual cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Pumping will be reduced if a trend toward a minimum threshold is identified.	The BCGSA will manage reductions in pumping rates or duration if trends indicate historical maximum groundwater levels will be reached. Individual agencies will be responsible for monitoring their wells and informing the BCGSA if this trend becomes apparent.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
No additional permitting or regulatory processes will be required.	The BCGSA will use the water level monitoring to add to existing data of historical maximum depths to water.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
Water level monitoring will be ongoing, beginning with adoption of the GSP. The benefit of more consistent data and understanding of groundwater levels will increase with time and continued monitoring.	There are data gaps in some geographic areas of the Basin which regular standardized monitoring will mitigate.

Table 8-3. Action 3 – Monitor Selected Groundwater Quality Constituents and Coordinate with the Regional Water Quality Control Board as Appropriate

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Routinely monitor water quality throughout the Subbasin as described in the monitoring plan. If a significant upward concentration trend is observed in areas that contribute to potable supply, cooperate with the Regional Water Quality Control Board for appropriate action. If a minimum threshold is observed in areas that contribute to potable supply, cooperate with the Regional Water Quality Control Board for appropriate action.	Regular water quality monitoring will benefit the Basin by serving as an early warning system to identify trends toward potential groundwater quality concerns in order to avoid undesirable results.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
Maintain or reduce the 5-year average concentrations of nitrate and total dissolved solids based on conditions assessed in each 5-year update.	Groundwater samples will be collected GSA agency personnel for wells they own and operate. This information will be transmitted to the GSA administrator who will compile and store the information and complete annual reports.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
Water quality monitoring will be implemented once the GSP is adopted. The minimum threshold for nitrate is defined as 5-year average concentrations (Subbasin-wide) not exceeding the 10 mg/L drinking water MCL for Nitrate as Nitrogen. The minimum threshold for TDS is defined as 5-year average concentrations (Subbasin-wide) not exceeding the 1,000 mg/L Secondary MCL for TDS. If significant upward concentration trends toward the minimum thresholds are observed in areas that contribute to potable supply, the GSA will coordinate with the Regional Water Quality Control Board as appropriate..	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$24,000 Annual cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Overdraft will not be a factor in this management action.	Groundwater extractions and recharge will not be a factor in this management action.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
No additional permitting or regulatory processes will be required.	Analysis shall be conducted by a certified laboratory with the State of California through the California Water Boards Environmental Laboratory Accreditation Program (ELAP). The BCGSA will incorporate data from the RWQCB when assessing water quality concentration trends.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
Water quality monitoring will be ongoing, beginning with adoption of the GSP. The benefit of more consistent data of groundwater quality will increase with time and continued monitoring.	Uncertainty when assessing potential water quality concerns may be communicated to the Regional Water Quality Control Board.

Table 8-4. Action 4 – Track Trends in Groundwater Levels near Temescal Wash and Take Action as Necessary

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Routinely track water levels in wells located near Temescal Wash and take action as specified.	Regular water level monitoring at Temescal Wash will benefit the Subbasin by decreasing the uncertainty of sustainable groundwater depths relating to riparian vegetation health.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
The measurable objective is the amount of surface water depletion that is less than the amount specified as the minimum threshold. Given the weak correlation between groundwater levels and vegetation health, no specific rise in shallow groundwater levels or increase in stream flow is identified as providing a preferred set of GDE conditions.	Static groundwater levels will be collected and compiled agency personnel who own and operate individual wells at a minimum frequency of monthly. Transducers will be utilized where practical. This information will be transmitted to the GSA administrator who will compile and evaluate trends toward the minimum threshold. If a trend toward the minimum threshold is observed, pumping rates or durations will be reduced in the affected area. Should a minimum threshold occur, pumping will be curtailed in the affected area.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
The minimum threshold is defined as more than two-thirds of monitored wells near Temescal Wash with static water levels lower than 35 feet below the adjacent channel elevation for a period of more than one year. If a trend toward the minimum threshold is observed, pumping rates or durations will be reduced in affected areas. If the minimum threshold is met, pumping will be curtailed in the affected area until groundwater levels recover.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$2,000 Annual cost. Funding source to be contributions from BCGSA member agencies. The majority of costs for this Action is covered under Action-2
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Transducers installed in wells near Temescal Wash where practical and/or manual measurements will be performed on selected wells.	The BCGSA will manage reductions in pumping rates or duration if trends indicate historical maximum groundwater levels will be reached. Individual agencies will be responsible for monitoring their wells and informing the BCGSA if this trend becomes apparent.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
No additional permitting or regulatory processes will be required.	The BCGSA will use the water level monitoring to add to existing data of historical maximum depths to water.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
Water level monitoring at Temescal Wash will be ongoing, beginning with adoption of the GSP. The benefit of more consistent data and understanding of the groundwater levels will increase with time and continued monitoring.	There is uncertainty regarding the relationship between water levels in production wells adjacent to Temescal Wash and the health of the riparian vegetation in the wash. For this reason, a specific project (Project 1) will be developed in an attempt to resolve this data gap and update the minimum threshold as required.

Table 8-5. Action 5 – Review InSAR Data on the SGMA Dataviewer During Updates

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Interferometric synthetic aperture radar (InSAR) data will be reviewed on the SGMA Dataviewer during annual reports and 5-year updates. If a subsidence trend is observed, the GSA will initiate studies to evaluate the causes of subsidence and/or potential errors.	Undesirable results relating to land subsidence have not been observed in the Basin, however subsidence may be subtle and cumulative over time. The benefit of regular monitoring of subsidence will be to potentially identify subsidence concerns early and initiate studies to evaluate the causes before undesirable results occur.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
The measurable objective for the land subsidence affecting land uses sustainability indicator is zero subsidence, acknowledging measurement error and other uncertainties.	InSAR data will be monitored annually and compiled on a 5-year basis by the GSA during completion of 5-year updates.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
Subsidence monitoring will be implemented once the GSP is adopted. The minimum threshold is defined as a rate of decline equal to or greater than 0.2 feet in any 5-year period with 2015 as the baseline condition. If a subsidence trend is observed, studies will be initiated to evaluate the causes of subsidence.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$4,000 Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Overdraft will not be a factor in this management action.	Groundwater extractions and recharge will not be a factor in this management action.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
No additional permitting or regulatory processes will be required.	The BCGSA will use InSAR data available on the SGMA Dataviewer to monitor for future potential subsidence.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
Subsidence monitoring will begin with adoption of the GSP and will be reported during 5-year updates. The benefit of more consistent data will increase with time and continued monitoring.	Many factors may contribute to subsidence, therefore if a trend is observed, studies will be initiated to evaluate the cause(s) before further action is considered.

Table 8-6. Project 1 – Investigate Groundwater/Surface Water Interaction at Temescal Wash

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Field studies and review of historical remote sensing and surface flow data in order to better understand the relationship between groundwater elevations and health of riparian habitat in Temescal Wash.	Technical studies at Temescal Wash will benefit the Basin by decreasing the uncertainty of sustainable groundwater depths relating to riparian vegetation health and improving the minimum threshold for groundwater/surface water interaction.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
The measurable objective is the amount of surface water depletion that is less than the amount specified as the minimum threshold. Given the weak correlation between groundwater levels and vegetation health, no specific rise in shallow groundwater levels or increase in stream flow is identified as providing a preferred set of GDE conditions.	The GSA will develop a request for proposal from qualified firms to conduct an initial study to evaluate the interaction of surface water and groundwater and the relationship of groundwater elevation on the health of riparian vegetation in Temescal Wash. The study may involve field biological surveys, review of historical surface flows, and/or review of historical photographs and remote sensing data. The work will result in recommendations for future monitoring and permitting requirements for installation of piezometers or drive points.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
The minimum threshold is defined as more than two-thirds of monitored wells near Temescal Wash with static water levels lower than 35 feet below the adjacent channel elevation for a period of more than one year. If a trend toward the minimum threshold is observed, pumping rates or durations will be reduced in affected areas. If the minimum threshold is met, pumping will be curtailed in the affected area until groundwater levels recover.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$151,000 One-occurance cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Pumping will be reduced if a trend toward a minimum threshold is identified.	The BCGSA Administrator will manage reductions in pumping rates or duration if trends indicate historical maximum groundwater levels will be reached. Individual agencies will be responsible for monitoring their wells and informing the BCGSA if this trend becomes apparent.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
Permitting or regulatory processes will be evaluated in the initial study.	Review of historical remote sensing, historical groundwater conditions, and/or biological surveys will be utilized.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
The project will start within 6 months of adoption of the GSP with the development of a request for proposal. The project is expected to last approximately one year. Benefits of the project will be to improve monitoring and required action to protect groundwater-dependent ecosystems.	There is uncertainty regarding the relationship between water levels in production wells adjacent to Temescal Wash and the health of the riparian vegetation in the wash. The reason for this project is to reduce that uncertainty and improve minimum thresholds regarding GDEs.

Table 8-7. Project 2 – Initiate a Survey of Private Wells

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
Field studies and review of available information in order to better understand the the location and construction charactristics of local private wells	Further information regarding private wells in the Basin will benefit achievment of the sustainability goal by decreasing the uncertainty related to the contruction characteristics and location of the private wells.
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
Maintain groundwater elevations above the historical minimum elevation and maintain groundwater levels within the historical operating range [such that private wells are not adversely affected.	The GSA will initiate a survey of private wells in order to confirm that the minimum thresholds are protective of the use of private wells for benificial use.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
The priviate well survey will be initiated after adoption of the GSP when resources are available.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$60,000 One-occurance cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Overdraft will be mitigated by reduction in pumping if identified.	The BCGSA will manage reductions in pumping rates or duration if trends indicate historical maximum groundwater levels will be reached. Individual agencies will be responsible for monitoring their wells and informing the BCGSA if this trend becomes apparent.
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
Permitting or regulatory processes are not requred for the survey of private wells	Existing well construction reports, well logs, and knowledge of local personel
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
The project will start after adoption of the GSP and will be conducted by the GSA administrator. Benefits of the project will be to improve understanding and protection of local wells.	There is uncertainty regarding the exact location and design of local private wells. The reason for this project is to reduce that uncertainty and improve protection of private wells.

Table 8-8. Project 3 – Evaluation of the Effects of Aggregate Pits on Groundwater Flow and Quality

Description of the Project or Management Action - §354.44(a)	**Project/management action benefits - §354.44(b)(5)**
The GSA administrator will initiate the investigations after adoption of the GSP by issuing an RFP to qualified firms. Although the details of the study of aggregate mine's effect on groundwater are yet to be determined, it is anticipated that the study may involve detailed review of the aggregate pit water budget (pumping, evapotranspiration, precipitation, and surface water flow infiltration), historical remote sensing images, historical hydrograph and streamflow information review, monitoring well construction, and/or interviews with local mine managers.	The benefits of investigating the interconnectivity of surface water within the open pit aggregate mines and adjacent groundwater will improve the hydrologic conceptual model and benefit the GSA in understanding methods to maintain sustainability in the vicinity of the mines
Description of the measurable objective(s) addressed - §354.44(b)(1)	**How the project/management action will be accomplished - §354.44(b)(6)**
The measurable objective is the amount of surface water depletion that is less than the amount specified as the minimum threshold.	The GSA Administrator will develop a request for proposals from qualified firms and manage progress of the contractor.
Circumstances and criteria for implementation - §354.44(b)(1)(A)	**Legal authority - §354.44(b)(7)**
The project will be implemented prior to the first 5-year update after the GSP has been adopted.	CWC § 10725.4 (a)(1) provides GSAs the authority to determine the need for groundwater management and (2) to prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
Process to provide the public notice of implementation - §354.44(b)(1)(B)	**Estimated cost and funding source - §354.44(b)(8)**
Notice of implementation with be provided in the public review period of the GSP and adoption of the GSP. Implementation of the management action will be internal and not affect landowners or water users in the Subbasin.	$165,000 One-occurance cost. Funding source to be contributions from BCGSA member agencies
Quantification of methods to mitigate overdraft, if overdraft conditions are identified - §354.44(b)(2)	**Management of groundwater extractions and recharge - §354.44(b)(9)**
Overdraft will not be a factor in this management action.	The BCGSA will manage reductions in pumping rates near the aggregate mines if appropriate based on investigations
Permitting and regulatory process - §354.44(b)(3)	**Supporting information and science - §354.44(c)**
If piezometers or monitoring wells will be installed as part of the project, well permits will be acquired from the County of Riverside Department of Environmental Health.	The BCGSA will use data gathered during the project and existing best practices to develop methods of avoiding undesirable results around the aggregate mines.
Timeframe for expected project/management action start and completion, accrual of benefits - §354.44(b)(4)	**Level of uncertainty - §354.44(d)**
The project is expected to be completed before the first 5-year update after the GSP has been adopted. Benefits will increase over time with a greater understanding of the relationship between aggregate mining and the local groundwater system.	There is uncertainty about the water budget in the vicinity of the aggregate mines. The project will seek to fill these data gaps.

9. PLAN IMPLEMENTATION

The official adoption of the Groundwater Sustainability Plan (GSP) by the Bedford Coldwater Groundwater Sustainability Authority (BCGSA) will initiate Plan implementation. After submittal of the GSP to the California Department of Water Resources (DWR) and during the DWR review period, the BCGSA will continue to communicate with stakeholders via the BCGSA's website and begin implementing the projects and management actions (Actions) described in Section 8. The Plan will be implemented to sustainably manage groundwater in the Bedford-Coldwater Subbasin (Basin) under the authority of the BCGSA and its member agencies.

9.1. PLAN IMPLEMENTATION RESOURCES AND RESPONSIBILITIES

Resources to implement the GSP will be derived from three different sources: a contracted GSP Administrator, personnel from the three BCGSA agencies (City of Corona [Corona], Elsinore Valley Municipal Water District [EVMWD], Temescal Valley Water District [TVWD]), and contracted firms qualified to perform specialized services.

Initially, BCGSA will develop a request for proposal (RFP) to retain a GSP Administrator. It is envisioned the Administrator will be a firm, or combination of firms that specialize in project management of groundwater-related projects. The GSP Administrator will be generally responsible for facilitating (though not necessarily performing) all aspects of GSP implementation through the first 5 years, including annual reporting and a 5-year update described in a following section. After 5 years, BCGSA may elect to renew the term of the Administrator or issue a new RFP for GSP administration.

Personnel from the three BCGSA agencies will be responsible for collection of information from their respective facilities or within their area of influence in the Basin. This will include depth to groundwater measurements, collection of groundwater quality samples, groundwater extractions, use of surface water supplies, and total water use. This information will be reported to the GSP Administrator for compilation, quality control and standardization, ultimately, storage in the BCGSA Data Management System (DMS).

For specialized studies such as biological surveys or other specialized work that cannot be accomplished by the Administrator, the Administrator will be responsible for coordinating with the BCGSA to develop RFPs and facilitating consultant selection by the BCGSA. After the consultant is selected by the BCGSA, the Administrator will be responsible for management of the specialty consultant, including monitoring/reviewing the work and providing recommendations regarding consultant progress payments. **Table 9-1** provides examples of GSP implementation tasks and the anticipated responsible party.

Table 9-1. Example GSP Implementation Responsibilities

GSP Task	Responsible Party
Collect information on groundwater extractions by water use sector, surface water sources, and total water use and report this data to the Administrator	Agency Personnel
Collect and compile static water levels in wells and report this information to the Administrator	Agency Personnel
Complete annual reports	GSP Administrator/Specialty Consultant
Coordinate appropriate action if measurement thresholds are exceeded	GSP Administrator
Maintain Data Management System (DMS)	GSP Administrator
Monitor selected groundwater quality all active production wells. Coordinate with RWQCB if action required	GSP Administrator
Review Interferometric Synthetic Aperture Radar (InSAR) data annually from the DWR DataViewer, and during 5-year updates	GSP Administrator
Complete 5-year updates including groundwater modeling updates	GSP Administrator/Specialty Consultant
Develop RFPs and manage specialty contractors	GSP Administrator
Maintain BCGSA website with periodic stakeholder communication	GSP Administrator
Conduct private well survey	GSP Administrator
Develop quarterly JPA board updates and cost estimates	GSP Administrator
Identify and apply for potential grant funding	GSP Administrator
Project No 2: Private Well Survey	GSP Administrator
Project No 1: Investigation of Interconnected Surface Water	Specialty Consultant
Project No 3: Investigation of Aggregate Pits	Specialty Consultant

9.2. PLAN IMPLEMENTATION COSTS

The costs associated with implementing the GSP can be considered either continually ongoing (operating) costs, or GSP implementation costs associated with specific management actions and projects. Estimated costs for both of these categories are provided below.

9.2.1. Operating Expenses

The cost of operating the BCGSA includes staff expenses, coordination between member agencies, maintenance of the BCGSA website and DMS site, legal expenses, auditing expenses, insurance, bank fees, and other administrative costs. These costs are estimated at approximately $60,000 annually (2021 dollars) based on experience since the BCGSA was formed.

9.2.2. GSP Implementation Costs

Implementation costs include costs to implement management actions and projects. As detailed in Tables 8-1 through 8-8 and summarized in Table 9-2, total annual costs (2021 dollars) are estimated at approximately $200,000 per year, while estimated one-occurrence costs for recommended projects and the first 5-year periodic GSP update is approximately $625,000.

Table 9-2. GSP Implementation Cost Estimates

Management Action and Projects	Estimated Annual Costs
Action 1 - Provide for Collection, Compilation, and Storage of Information Required For Annual Reports and Submit Annual Reports	$76,000
Action 2 - Routinely Record Groundwater Levels and Take Action if Necessary	$110,000
Action 3 - Monitor Selected Groundwater Quality Constituents and Coordinate with the Regional Water Quality Control Board as Appropriate	$24,000
Action 4 - Track Trends in Groundwater Levels near Temescal Wash and Take Action as Necessary (field costs included in Action 2)	$2,000
Action 5 - Review InSAR Data on the DWR DataViewer During Annual and 5-Year Updates	$4,000
Total Estimated Annual Implementation (Non-Operating) Costs	$216,000
Project 1 – Investigate Groundwater/Surface Water Interaction at Temescal Wash	$151,000
Project 2 – Initiate a Survey of Active Private Wells	$60,000
Project 3 – Evaluation of the Effects of Aggregate Pits on Groundwater Flow and Quality	$165,000
First Periodic 5-year GSP Update	$250,000
Total Estimated One-Occurrence Costs (First 5 years)	$626,000

9.2.3. Funding Methods for Operating Expenses and GSP Implementation Costs

The funding method for operating expenses and GSP implementation costs is by contributions by BCGSA member agencies (Corona, EVWMD, and TVWD). This is the same mechanism utilized to fund development of the GSP (with significant supplemental contribution though

California Proposition 1 Grant funding). The estimated costs are well within budget projections for the next several years provided to the BCGSA Board of Directors.

9.3. ANNUAL REPORTING

The BCGSA is required to submit an annual report to DWR by April 1st of each year following adoption of the GSP. The first annual report will be due in April of 2022. The annual report will be facilitated by implementing Actions 1 and 2, which provide for collection of the required information and production of the annual report. The annual report will include the following components as described in GSP Regulations for the preceding water year:

- General information – Executive summary, location map.
- Detailed description and graphical representation of the following components of the Basin:
    - Groundwater elevation data from monitoring wells within the monitoring network;
    - Groundwater extraction data for the preceding water year;
    - Surface water supply used or available for use;
    - Total water use; and
    - Change in groundwater storage.
- Description of progress towards implementing the Plan – implementation of projects or management actions since the previous annual report.

It is currently anticipated that the annual reports will be produced by the GSP Administrator or Specialty Consultant. The costs associated with producing these reports will be incorporated into the annual budget of the BCGSA.

9.4. NEW INFORMATION AND CHANGES

The GSP has been developed based on the best available information. However, it is recognized that during implementation of the GSP, new information on groundwater conditions, changes in land use or climate, and or changes in the regulatory environment can be expected. Changes in GSP administration may also be appropriate based on experience. When these changes occur, the BCGSA will react with appropriate changes in GSP administration, data collection, and/or groundwater management methods. If the changes are significant, stakeholders and the BCGSA Board of Directors will be kept informed of these changes via Board minutes, the BCGSA website, and emails to stakeholders.

9.5. PERIODIC EVALUATIONS

BCGSA will evaluate the GSP at least every five years and provide an assessment to DWR as required by SGMA Regulations. The assessment will provide an update on the progress of achieving sustainability goals in the Basin and will include the following:

- A description of current groundwater conditions for each sustainability indicator applicable to the Basin relative to measurable objectives and minimum thresholds.
- A description of the implementation of any projects or management actions and their effect on groundwater conditions.
- Any revisions to the basin setting, management areas, or the identification of undesirable results and the setting of minimum thresholds and measurable objectives.
- An evaluation of the basin setting as a result of any significant changes, new information, or changes in water use.
- A description of the monitoring network within the Basin, including any data gaps and areas of the Basin that are represented by data that does not satisfy the requirements of SGMA requirements outlined in Title 23 of the California Code of Regulations (CCR) Sections 352.4 and 354.34(c).
- A description of significant new information that has been made available since GSP adoption, amendment, or last five-year assessment.
- A description of relevant actions taken by the BCGSA, including a summary of regulations or ordinances related to the GSP.
- Information describing any enforcement or legal actions taken by the BCGSA to continue the sustainability goals of the Subbasin.
- A description of completed or proposed GSP amendments.

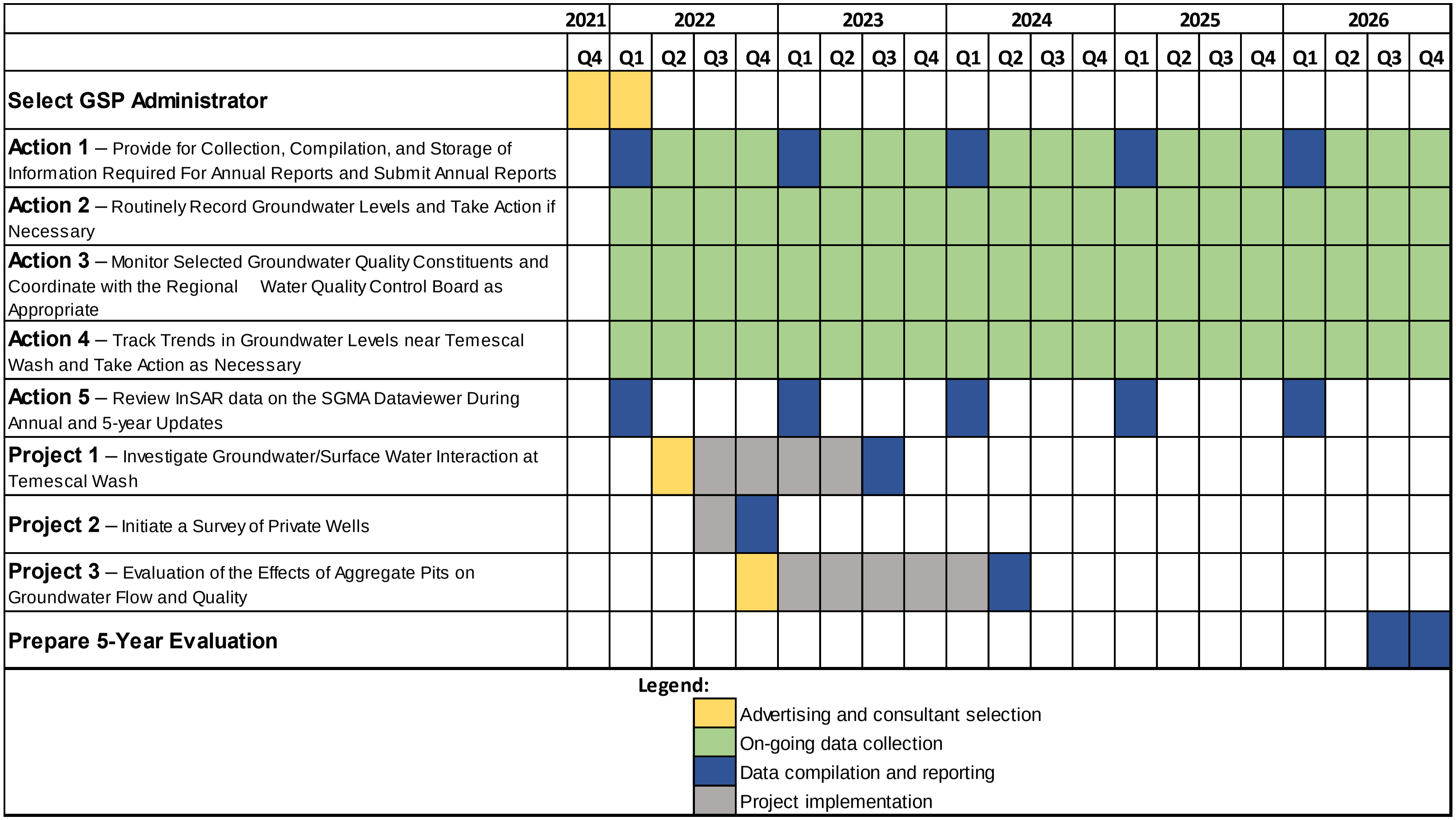
As with the annual reports, the GSP Administrator/Specialty Consultant will be responsible for completion of the five-year assessment with assistance from BCGSA staff. Both annual reports and periodic updates will be available to the public via the BCGSA website as well as the DWR SGMA website.

The cost of the periodic updates is dependent on the complexity of changes occurring in the Basin since the adoption of the GSP but are estimated to be in the range of $250,000 per update (2021 dollars).

9.6. SCHEDULE FOR IMPLEMENTATION

The BCGSA has committed to implementing the GSP upon adoption and completing the projects and management actions necessary to monitor and maintain sustainability within the first 5 years of initiation of the GSP. A preliminary schedule for implementation is shown in **Figure 9-1**. After completion of the draft GSP but before adoption (3rd and 4th quarter of 2021) the BCGSA will begin advertisement of an RFP for the GSP Administrator such that the GSP Administrator will be ready to facilitate management actions immediately after GSP adoption. The GSP Administrator will conduct the survey of private wells and develop RFPs for surface/groundwater and aggregate pit studies within the first year of GSP implementation.

Figure 9-1. Schedule for GSP Implementation



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APPENDIX A

Joint Powers Agreement forming the Bedford-Coldwater Groundwater Sustainability Agency

JOINT POWERS AGREEMENT

by and among

THE CITY OF CORONA,
a California general law city,

ELSINORE VALLEY MUNICIPAL
WATER DISTRICT,
a municipal water district

and

TEMESCAL VALLEY WATER DISTRICT,
a California water district

for the formation of a joint powers authority and management of

THE BEDFORD-COLDWATER SUB-BASIN
OF THE ELSINORE BASIN

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JOINT POWERS AGREEMENT BY AND AMONG THE CITY OF CORONA, ELSINORE VALLEY MUNICIPAL WATER DISTRICT, AND TEMESCAL VALLEY WATER DISTRICT FOR THE FORMATION OF A JOINT POWERS AUTHORITY AND MANAGEMENT OF THE BEDFORD-COLDWATER SUB-BASIN OF THE ELSINORE BASIN

THIS JOINT POWERS AGREEMENT ("Agreement") is entered into as of February 28, 2017, by and between the CITY OF CORONA ("Corona"), a California General Law City organized and existing under the laws of the State of California, ELSINORE VALLEY MUNICIPAL WATER DISTRICT ("EVMWD"), a Municipal Water District organized under Water Code §§ 71000 et seq., and the TEMESCAL VALLEY WATER DISTRICT ("TVWD"), a California Water District organized under California Water Code §§ 34000 et seq., hereinafter collectively referred to as "Members", with reference to the following:

A. WHEREAS, in September 2014, the Governor signed three bills (SB 1168, SB 1319, and AB 1739) into law creating the Sustainable Groundwater Management Act of 2014 ("SGMA"); and

B. WHEREAS, SGMA generally requires the formation of one or more Groundwater Sustainability Agencies ("GSA" or "GSAs") responsible for implementing sustainable groundwater management and preventing "undesirable results" in groundwater basins and sub-basins designated as a medium or high priority basin by the California Department of Water Resources ("DWR") in its Bulletin 118 inventory of California groundwater basins; and

C. WHEREAS, DWR has designated the Bedford-Coldwater Sub-Basin (the "Sub-Basin"), as a medium priority groundwater basin under Bulletin 118; and

D. WHEREAS, each of the Members overlies a portion of the Sub-Basin and exercises water management, water supply or land use authority within a portion of the Sub-Basin; and

E. WHEREAS, the Members are local agencies that can exercise powers related to groundwater management within their jurisdictional boundaries and qualify individually to serve as a GSA within portions of the Sub-Basin per Water Code Section 10723; and

F. WHEREAS, under SGMA, a combination of local agencies may elect to form a joint powers authority ("JPA") to serve as the GSA for all or portions of the Sub-Basin through a joint powers agreement; and

G. WHEREAS, the Members intend by this Agreement to create a JPA to implement SGMA in the entire Sub-Basin, and are authorized to enter into this Agreement pursuant to the Joint Exercise of Powers Act, Government Code §§ 6500 et seq., for the purpose of acting as a separate public agency that can carry out all obligations, and exercise all powers, of a GSA in all areas of the Sub-Basin; and

H. WHEREAS, under SGMA, a GSA, including a JPA composed of one or more SGMA-eligible local agencies, must file a notice of intent with DWR by June 30, 2017 indicating the GSA's intent to undertake sustainable groundwater management within all or portions of a groundwater basin; and

I. WHEREAS, the governing boards of each of the three Members have formally agreed to: (1) enter into this Agreement; (2) form a JPA that can jointly exercise the powers common to the Members and fulfill all legal obligations imposed by SGMA; and (3) authorize the JPA to promptly file all necessary documentation with DWR so as to permit the JPA to become the exclusive GSA for the entire Sub-Basin; and

J. WHEREAS, the Members further intend by this Agreement to provide for the management and funding commitments reasonably anticipated to be necessary for the above purposes and for the purpose of ensuring that the Sub-Basin is sustainably managed in accordance with the timelines established by SGMA; and

K. WHEREAS, the Members understand that Corona has entered into a Water Enterprise Management Agreement and a Wastewater Enterprise Management Agreement, both dated as of February 6, 2002, with the Corona Utility Authority ("CUA") for the maintenance, management and operation of those utility systems (collectively "the CUA Management Agreements"). To the extent that this Agreement is deemed to be a "material contract" under either of the CUA Management Agreements, Corona enters into this Agreement on behalf of the CUA and subject to the terms of the applicable CUA Management Agreements.

ACCORDINGLY, IT IS AGREED BY ALL MEMBERS:

1. RECITALS: The foregoing recitals are incorporated as terms of this Agreement.

2. DEFINITIONS: Unless otherwise required by the context, the following terms shall have the following meanings:

a. "<u>Administering Member</u>" shall mean the Member designated by the Authority Board to provide administration, operation and staffing of the Authority so as to ensure the Authority complies with this Agreement and all legal requirements. The Board is not required to designate an Administering Member, and a Member so designated is not required to accept the designation.

b. "<u>Administrator</u>" shall mean the individual selected to act as the chief executive of the Authority, and the person responsible for its day to day operations. The Administrator may, but it is not required to be, an employee of one of the Members.

c. "<u>Authority</u>" and "<u>JPA</u>" as used herein shall, unless otherwise noted, mean the "Bedford-Coldwater Groundwater Sustainability Authority," the separate public agency created by this Agreement and Government Code Sections 6507 and 6508, and the entity charged by this Agreement with becoming the exclusive GSA for the Sub-Basin.

d. "<u>Board</u>" or "<u>Board of Directors,</u>" shall, unless otherwise indicated, mean the Board of Directors of the Authority.

e. "<u>DWR</u>" shall mean the California Department of Water Resources.

f. "<u>Effective Date</u>" shall mean the date on which all Members have signed this Agreement.

g. "Fiscal Year" shall run from July 1 through June 30.

h. "Groundwater Sustainability Agency" or "GSA" shall mean a groundwater sustainability agency as defined in SGMA, Water Code § 10721.

i. "Groundwater Sustainability Plan," "Plan," or "GSP" shall have the same meaning as provided in SGMA, Water Code § 10721.

j. "Member" shall mean any of the individual signatories to this Agreement, and "Members" shall collectively mean two or more of the signatories to this Agreement.

k. "SGMA" shall mean the Sustainable Groundwater Management Act of 2014, as amended, and any regulations of DWR or the State Water Resources Control Board that implement SGMA.

l. "Special Projects" shall mean projects that are consistent with, and within the scope of activities, authorized by this Agreement, but which are undertaken by fewer than all the Members in the name of the Authority in accordance with the procedures outlined in Sections 10 and 14.

m. "Sub-Basin" shall mean the Bedford-Coldwater Sub-Basin of the Elsinore Groundwater Basin, Sub-Basin No. 8-004.2, as identified in the most recent modifications of Bulletin 118 by DWR.

n. "SWRCB" shall mean the California State Water Resources Control Board.

3. CERTIFICATION: Each Member, as a signatory to this Agreement, certifies and declares that it is a public agency, as defined by Government Code § 6500, that is authorized to enter into a joint powers agreement to contract with each other for the joint exercise of any common power under Article 1, Chapter 5, Division 7, Title 1 of the Government Code or any power otherwise granted to one or more of the Members by SGMA.

4. CREATION OF SEPARATE AGENCY: There is hereby created, per Government Code §§ 6507 and 6508, an agency separate from the parties to the Agreement, and which is responsible for the administration of this Agreement, to be known as the "**BEDFORD-COLDWATER GROUNDWATER SUSTAINABILITY AUTHORITY**." Within thirty (30) days of the Effective Date of this Agreement, the Members, and/or the Authority shall: (a) cause a notice of this Agreement to be prepared and filed with the office of the California Secretary of State as required by Government Code § 6503.5; (b) file a copy of this Agreement with the State Controller per Government Code § 6503.6; and (c) file a copy of this Agreement with the Local Agency Formation Commission ("LAFCO") for Riverside County per Government Code § 6503.6.

5. PURPOSES AND MEMBER RESPONSIBILITIES: The Authority is formed with the purpose and intent of jointly creating a separate legal entity to fulfill the role and legal obligations of a GSA required by SGMA, to include complying with SGMA and ensuring sustainable groundwater management throughout the Sub-Basin, so that the Members may collaboratively and cost effectively develop, adopt, and implement a GSP for the Sub-Basin in accordance with pertinent regulatory timelines. The geographic boundaries of the GSA that will be formed by the Authority, which will encompass the entire Sub-Basin, are as depicted in the map attached hereto as Exhibit "A," which is incorporated herein by reference. The Authority may also represent the Members, as appropriate, in discussions and transactions with other local agencies, to include (but not limited to) the development of inter-basin coordination agreements with other GSAs in Riverside County, and agreements with other local agencies or groundwater sustainability agencies as may be required to ensure compliance with SGMA for the Sub-Basin.

6. POWERS: The Members intend that the Authority provide for the joint exercise of powers common to the Members as such powers relate to the management of the Sub-Basin, and for the exercise of such additional powers as are conferred by law in order to meet the requirements of SGMA. The Members are each SGMA-eligible local agencies empowered by the laws of the State of California to exercise the powers specified in this Agreement, and such other powers as are granted to GSAs by SGMA. These common powers shall be exercised for the benefit of any one or more of the Members or otherwise in the manner set forth in this Agreement. Subject to the limitations set forth in this Agreement, the Authority shall have the powers to perform all acts necessary to accomplish its purposes as stated in this Agreement, as authorized by law, including but not limited to the following:

a. To make and/or assume contracts and to employ agents, employees, consultants and such other persons or firms as the Board may deem necessary, to the full extent of the Authority's power, including, but not limited to, engineering, hydrogeological, and other consultants, and with attorneys and accountants and financial advisors, for the purpose of providing any service required by the Authority to accomplish its purposes, or to otherwise take such actions as are necessary to ensure the Sub-Basin is managed in accordance with the requirements of SGMA;

b. To conduct all necessary research and investigations, and to compile appropriate reports and collect data from all available sources to assist in preparation and implementation of a GSP, and to support the development of such other agreements as may be necessary to ensure the Sub-Basin can be sustainably managed;

c. To cooperate, act in conjunction with, and contract with the United States, the State of California, or any agency thereof, the County of Riverside, or such other entities or persons as the Board may deem necessary to ensure that the Authority fulfills its obligations under SGMA;

d. To apply for, accept and receive licenses, permits, water rights, approvals, agreements, grants, loans, gifts, contributions, donations or other aid from any agency of the United States, the State of California or other public or private person or entity necessary for fulfilling the purposes of SGMA in the Sub-Basin;

e. To acquire by grant, purchase, lease, gift, devise, contract, construction, eminent domain or otherwise, and hold, use, enjoy, sell, let, and dispose of, real and personal property of every kind, including lands, water rights, structures, buildings, rights-of-way, easements, and privileges, and construct, maintain, alter, and operate any and all works or improvements, within or outside the agency, necessary or proper to carry out any of the purposes of the Authority as specified in this Agreement and/or the requirements of SGMA;

f. To enforce the requirements of SGMA within the Sub-Basin to the extent authorized by law including, but not limited to, the imposition and collection of civil penalties as authorized by SGMA;

g. To sue and be sued in its own name;

h. To provide for the prosecution of, defense of, or other participation in actions or proceedings at law or in public meetings in which the Members, pursuant to this Agreement or otherwise pertaining to management of the Sub-Basin, may have an interest, and to employ counsel or other expert assistance for that purpose;

i. To adopt an initial operating budget and initial Member contributions within ninety (90) days of the execution of this Agreement, and an annual budget and Member contributions, by March 31 of each subsequent Fiscal Year;

j. To incur debts, liabilities or obligations, subject to the limitations provided in this Agreement;

k. To impose fees authorized by SGMA (Water Code §§ 10730-10731), without any limitation on a Member's separate ability to impose fees within its jurisdiction, to fund the cost of furthering the purposes of this Agreement, complying with SGMA, and sustainably managing groundwater within the Sub-Basin;

l. To adopt rules, regulations, policies and procedures for governing the operation of the GSA and adoption and implementation of the GSP consistent with the powers and purposes of the Authority and as authorized by SGMA;

m. To investigate legislation and proposed legislation affecting SGMA and the Sub-Basin and make appearances regarding such matters;

n. Subject to the limitations imposed by this Agreement, to take such actions as are deemed necessary by the Board to achieve the purposes stated above and to provide for the sustainable management of the Sub-Basin; and

o. To adopt and revise bylaws, rules, ordinances, and resolutions in a manner authorized by law and not inconsistent with the terms of this Agreement.

Any power necessary or incidental to the foregoing powers shall be exercised by the Authority in the manner provided for under the legal authority applicable to the City of Corona except as otherwise provided by law or in this Agreement.

7. OBLIGATIONS OR LIABILITIES OF AUTHORITY: No debt, liability or obligation of the Authority shall constitute a debt, liability or obligation of any of the Members, except as otherwise provided in this Agreement or unless otherwise required by law.

8. DESIGNATION OF ADMINISTERING MEMBER/ADMINISTRATOR: The powers of the Authority provided in this Agreement shall be exercised in the manner provided by this Agreement. The Board may designate an Administering Member and/or an Administrator to provide all or a portion of the administrative (or other) services required by this Agreement, SGMA, or other legal authority. However, whether or not the Board decides to designate an Administering Member, each Member shall nevertheless be responsible, when requested by the Board, for designating staff from their agency to coordinate with the Board and other Members, and for otherwise ensuring the Authority has sufficient staffing and administrative support to comply with this Agreement and other legal obligations.

9. ORGANIZATION:

a. Additional Members: The Board may allow additional members to join the Authority. Additional Members must be local agencies capable of being designated as a GSA under SGMA. The Board may set whatever conditions it deems necessary as a precondition to addition of the new Member, to include requiring the additional Members to reimburse the other Members for a proportionate share of the costs already incurred by the existing Members.

b. Bylaws: The Board shall adopt bylaws governing the management of the Authority within 180 days of the Effective Date. The bylaws shall require the Board to develop a conflict of interest code for the Authority compliant with California law, and to otherwise ensure that the Board operates in a manner that is fully compliant with the Brown Act, the Joint Exercise of Powers Act, Government Code §§ 6500 et seq., SGMA, and all other applicable legal requirements.

c. Committees: The Board may create committees as authorized by law.

d. Governing Board: The Authority shall be governed by a Board of Directors which shall be composed of one (1) elected representative of each Member, appointed by each Member. The governing body of each Member shall determine in its sole discretion the person it will appoint to the Authority Board of Directors. The Board of Directors shall receive no compensation from the JPA for serving on the Board of the JPA.

e. Meetings: Regular meetings of the Board may be held quarterly, or as the Board determines necessary, on such dates and times and at such locations as the Board shall fix by resolution. Special meetings of the Board shall be called in accordance with Government Code § 54956. All meetings of the Board shall comply with the provisions of the Ralph M. Brown Act (Government Code §§ 54950 et seq.).

f. Officers: The officers of the Authority shall be a Chairperson, and Vice-Chairperson, and such other officers as the Board shall designate. The election of officers will take place at the first meeting of the JPA Board, and subsequently in the first Board meeting of each new Fiscal Year unless the time of election is otherwise designated in the Authority bylaws. The officers or persons who have charge of, handle or have access to any property of the Authority shall be designated in the bylaws, and such officers and persons shall comply with all applicable requirements of Government Code § 6505.1.

g. Quorum: Two-thirds (2/3) of the Board of Directors shall constitute a quorum in order to conduct business.

h. Rules: The Board may adopt such other rules, policies, and regulations as it deems proper consistent with all applicable laws, this Agreement, and the Authority's bylaws.

i. Term: The Authority Board Members shall serve without terms and at the pleasure of the legislative body which appointed them.

j. Treasurer: The Treasurer of the Board shall be formally designated by a resolution adopted by the Board of Directors stating the effective date of the appointment and the term of the appointment.

k. Voting: Each Director shall have one vote. A simple majority of the quorum shall be required for the adoption of a motion, resolution, contract authorization or other action of the Board, except that:

(1) A majority vote of less than a quorum may vote to adjourn;

(2) Any of the following actions shall require a unanimous vote of the entire Board:

(a) Adoption, modification or alteration of the GSP, or of the GSA boundaries;

(b) Adoption of assessments, charges or fees;

(c) Adoption or modification of ramp-downs or curtailments;

(d) Initiation/settlement of enforcement actions;

(e) Adoption of an initial budget;

(f) Adoption or modification of the annual budget, as further described in Section 14, below;

(g) Initiation/termination or settlement of any litigation or threatened litigation that involves the Authority;

(h) Admission of additional Members to the Authority;

(i) Appointment, employment, or dismissal of the Authority's Administrator and/or Legal Counsel;

(j) Designating an Administrator or Administering Member;

(k) Setting the amounts of any contributions or fees to be made or paid to the Authority by any Member, including extraordinary costs as defined in Section 15;

(l) Acquisition by grant, purchase, lease, gift, devise, contract, construction, or otherwise, and hold, use, enjoy, sell, let, and dispose of, real and personal property of every kind, including lands, water rights, structures, buildings, rights-of-way, easements, and privileges, and construct, maintain, alter, and operate any and all works or improvements, within or outside the agency, necessary or proper to carry out any of the purposes of the Authority;

(m) Replacement of the annual special audit required by Government Code § 6505(f) with an audit covering a two year period;

(n) Amendments or modifications of this Agreement;

(o) Adoption or modification of bylaws or other binding rules governing the operations of the JPA Board;

(p) Adoption of ordinances;

(q) Issuance of bonds or other indebtedness;

(r) Allocating funding received from grants, loans, or from other alternative sources, in a manner that does not result in equal sharing of alternative funding among the Members;

(s) To apply for, accept and receive licenses, permits, water rights, approvals, agreements, grants, loans, gifts, contributions, donations or other aid from any agency of the United States, the State of California or other public or private person or entity necessary for fulfilling the purposes of SGMA in the Sub-Basin.

10. SPECIAL PROJECTS AND PROJECT COMMITTEES:

a. With the prior approval of the entire Board, Members may undertake Special Projects in the name of the Authority, utilizing the legal powers granted to the Authority under SGMA, the Joint Exercise of Powers Act, or other applicable legal authorities. All Members shall be given the opportunity to participate in Special Projects, but shall not be required to participate.

b. A Member considering a new project, other than a groundwater extraction project, where the project is reasonably likely to affect groundwater management in the Sub-Basin shall consult with the other Members before individually undertaking the project to determine whether that individual project might otherwise be better accomplished as an Authority Special Project.

c. Members electing to participate in a Special Project shall enter into a Special Project Agreement in accordance with Section 14.a(4) of this Agreement. Such Special Project Agreement shall provide that: (a) no Special Project undertaken pursuant to such agreement shall conflict with the terms of this Agreement or the GSP; (b) the Members to the Special Project Agreement shall indemnify, defend and hold harmless the Authority, and Members of the Authority who are not participating in the Special Project, against any costs liabilities, or expenses of any kind arising as a result of the Special Project; (c) all benefits and liabilities attributable to a Special Project shall solely be the benefits and liabilities of the Members that have entered into the Special Project Agreement, and non-participating Members shall have no rights, and incur no obligations or liabilities, in the Special Project.

11. FISCAL AGENT, DEPOSITORY AND ACCOUNTING: The "Treasurer" appointed by the Board is designated as the fiscal agent and depository for the Authority per Government Code §§ 6505.5 and 6505.6. The Treasurer of the Authority shall be the treasurer of one of the Authority's Members, or a certified public accountant designated by the Board, or an officer or employee designated per Government Code § 6505.6. The Treasurer shall be the depositary and have custody of all money of the Authority, from whatever source, subject to the applicable provisions of any indenture or resolution providing for a trustee or other fiscal agent. All funds of the Authority shall be held in the operating fund established by Section 14, or such other separate accounts as may be necessary, in the name of the Authority and not commingled with the funds of any Member or any other person or entity. Full books and accounts shall be maintained for the Authority in accordance with generally accepted accounting principles applicable to governmental entities per Government Code §§ 6505 et seq., and any other applicable laws of the State of California.

12. ACCOUNTABILITY, REPORTS AND AUDITS: There shall be strict accountability of all funds, and an auditor designated by the Board shall report any and all receipts and disbursements to the Board with such frequency as shall reasonably be required by the Board. The Authority will utilize the services of an outside independent certified public accountant to make an annual audit of the accounts and records of the Authority as required by Government Code § 6505, unless the Members, elect to conduct the audit for a two (2) year period. In each case, the minimum requirements of the audit shall be those prescribed by the State Controller for special districts pursuant to Government Code § 26909, and shall conform to generally accepted accounting principles. The outside independent certified public accountant selected by the Authority as auditor shall be formally designated by a resolution adopted by the Board of Directors stating the effective date of the appointment and the term of the appointment.

13. OPERATING BUDGET AND EXPENDITURES: The Board shall adopt a budget as specified in the bylaws and as set forth in Section 14, below. Unless otherwise required by this Agreement or applicable law, the Authority's Treasurer shall draw checks or warrants or make payments as specified in the bylaws of the Authority. The Authority may, consistent with the bylaws, invest any money in the treasury that is not needed for its immediate necessities.

14. CONTRIBUTIONS/BUDGETS: Unless otherwise provided in this Agreement, the Members shall equally share in the costs of the JPA. The Authority shall establish an operating fund. The fund shall be used to pay all administrative, operating and other expenses incurred by the Authority, and shall be funded by equal Member's contributions for payment of costs of the Authority. The Board may direct that any surplus funds be returned to the Members, per Government Code § 6512, in proportion to the contributions made by each Member.

a. <u>Authority Budgets</u>: Authority budgets shall be established as follows:

(1) General Operating Budget. No more than ninety (90) days following the first meeting of the Board, and annually thereafter in the month of March or other mutually agreed upon timeframe, a general operation budget (the "Operating Budget") shall be adopted by the Board. The Operating Budget shall be prepared in sufficient detail to constitute an operating outline for the purpose of establishing rates and/or contributions to be billed to and paid by the Members. The operating rates and/or contributions to be billed to and paid by each Member shall be based upon an equal contribution by each Member. The Operating Budget shall outline anticipated revenues and planned expenditures to be made during the ensuing Budget year by functional category such as operations and maintenance, administration, projects, programs, planning, study and any applicable contributions to operate related reserves. For the purpose of the Operating Budget, operating shall mean any financial activity related to exchange transactions, as defined by applicable generally accepted accounting principles ("GAAP") associated with the principal activity of the JPA. The Operating Budget shall be adopted by unanimous approval of the Board. The rates and contributions approved by the Board shall be paid by the Members pursuant to Section 14.c below.

(2) Non-Operating Budget. No more than ninety (90) days following the first meeting of the Board, and annually thereafter in the month of March or other mutually agreed upon timeframe, a non-operating budget (the "Non-Operating Budget") shall be adopted by the Board. The Non-Operating Budget shall be prepared in sufficient detail to constitute a non-operating outline for the purpose of establishing rates and/or contributions to be billed to and paid by the Members. These rates and/or contributions shall be based upon equal contributions by each Member. At a minimum, the Non-Operating Budget shall outline anticipated revenues and planned expenditures for non-operating financial activities for the ensuing Fiscal Year, inclusive of any amount necessary for servicing debt. For the purpose of the budget, Non-Operating shall mean any financial activity related to non-exchange transactions, as defined by applicable GAAP. Examples of non-exchange transactions include investment income, contributed capital from Members for capital debt service, interest expense, and return of capital to Members. The Non-Operating Budget shall be adopted by unanimous approval of the Board. The rates and contributions approved by the Board shall be paid by the Members pursuant to Section 14.c below.

(3) Capital Project Budget. No more than ninety (90) days following the first meeting of the Board, and annually thereafter in the month of March, or other mutually agreed upon timeframe, a capital project budget (the "Capital Project Budget") shall, if applicable, be adopted by the Board. The Capital Project Budget, if applicable, shall be prepared in sufficient detail to constitute a capital project outline to assess contributions to be paid by the Members and expenditures to be paid by the Members during the ensuing year for capital projects needed for major repair, replacement, expansion and efficiency of any capital improvements constructed or installed by or on behalf of the Authority. These contributions shall be based upon equal contribution by each Member, subject to unequal contribution amounts for Special Projects, as addressed in Sections 10 and 14.a.(4). The Capital Project Budget shall be adopted by unanimous approval of the Board. The contributions approved by the Board shall be paid by the Members pursuant to Section 14.c below.

(4) Special Project Budgets. In addition to the Operating Budgets, the Non-Operating Budgets, and the Capital Project Budget, the Board may budget at any time for the study, implementation or construction of any Special Project, program or study proposed to be undertaken by the Authority for matters not deemed to be of general benefit to all Members. A Special Project budget and written Special Project Agreement of the Members who consented to participation in the Special Project shall be established for each Special Project, which budget and agreement shall determine the respective obligations, functions, and rights of the Members involved and of the Authority. The directors of the Board representing the Members who will be involved in financing and implementing the Special Project shall be and constitute a "Special Project Committee," for purposes of administration and implementation of the Special Project. No Special Project shall be acquired or constructed by the Board without the consent of each of the governing boards of the participating Members. Ratification of the Special Project budget by each of the participating Members shall constitute consent for the acquisition and construction of the Special Project. Notwithstanding the foregoing, no debt shall be incurred by the Authority for a Special Project without the unanimous consent of the Board. Any rates and contributions approved by the Special Project Committee and approved by the participating Members shall be paid by the participating Members pursuant to Section 14.c below.

Where the Board has approved one or more Special Projects, annually thereafter in the month of March (or other mutually agreed upon timeframe), a Special Project budget shall be developed by each Special Project Committee if required by the applicable Special Project Agreement, Each Special Project budget shall include, without limitation, the following:

(i) Administrative expenses;

(ii) Studies and planning costs;

(iii) Engineering and construction costs;

(iv) The allocation of costs, including debt service costs, if any, among participating Members;

(v) Annual maintenance and operating expenses for the project; and

(vi) A formula for allocating annual maintenance and operating expenses, if any.

All actions by a Special Project Committee shall be deemed actions of the Authority and shall be taken in the name of the Authority, provided, only the participating Members shall have rights and obligations in the Special Project as herein provided.

b. Failure to Obtain Budget Approvals. In the event a budget acceptable to the Board is not approved prior to the start of a Fiscal Year the Authority shall continue to operate at the level of expenditure as authorized below:

(1) General Operating Budget. The Operating Budget shall be at the expenditure level authorized by the last approved Operating Budget increased by the Consumer Price Index ("CPI") with a minimum increase of no less than two percent (2%). The CPI shall mean the change in CPI for Urban Wage Earners and Clerical Workers for the Los Angeles County, Orange County, and Riverside County areas for the all items category for the 12-month period ending the February prior to the beginning of the Fiscal Year budgeted as determined by the U.S. Department of Labor, Bureau of Labor Statistics, or other mutually agreeable source if such a CPI is no longer available. This factor will be applied to the Operating Budget until such time as a new Operating Budget is approved by the Authority. Any shortfall in revenues will be made up from available reserves dedicated by the Board for such a purpose, and if insufficient to cover the shortfall, any available reserve funds not designated by the Board for other purposes or otherwise legally restricted for other purposes by external parties. Reserves shall mean any available cash or investments.

(2) Non-Operating Budget. The Non-Operating Budget shall automatically be established at the required level necessary to meet annual debt service requirements including any revenue coverage covenants. Each Member shall contribute to the Authority such amounts which will yield during each Fiscal Year net revenues payable to the Authority sufficient for the Authority to satisfy all covenants in any indentures, loan agreements or other documents entered into by the Authority and to enter into such other agreements as are necessary for the Authority to secure financing to pay the acquisition price for any facilities authorized by the Authority.

(3) Capital Project Budget. The Capital Project Budget shall automatically be established at the required level necessary to implement capital projects previously approved by the Authority.

c. Payments of Amounts Due. The payments owed for contributions from each Member to the Authority shall be due, payable, and delivered by the Members to the Authority within forty-five (45) days after receipt of a billing therefor from the Authority. To the extent permitted by state law, unpaid and past due contributions shall bear interest at ten percent (10%) per annum, calculated daily, from the date due to the date payment is received by the Authority.

15. ASSESSMENTS FOR EXTRAORDINARY COSTS: In the event the Authority should experience an unanticipated need to pay for extraordinary costs (e.g., those costs that are unanticipated and not otherwise funded through the budget), including, but not limited to the costs of litigation or indemnification as provided in this Agreement, and to the extent that such costs cannot otherwise be reasonably funded through use of reserves on hand or through the other revenue sources authorized by this Agreement, the Board may allocate the additional costs to the Members, whether such extraordinary costs are actually incurred or estimated to be necessary. Unless otherwise specifically allocated to one or more Members by the unanimous vote of the Board, all allocations of extraordinary costs shall be shared equally by each Member. The Members agree that they will then contribute their proportionate share of the extraordinary costs within a reasonable period of time as determined by the Board, or as otherwise specified in the Bylaws.

16. STAFFING: The Board shall provide for staffing of the Authority in accordance with procedures established in the bylaws. Such staffing shall ensure the Authority is able to accomplish all requirements imposed by SGMA, this Agreement, and/or any other requirements imposed by law. Legal counsel shall be appointed by the Board and shall serve at the pleasure of the Board. Legal counsel may be an attorney that also performs work for one of the Members, provided appropriate waivers suitable to the Board, and counsel for all of the Members, are first obtained.

17. DISPUTE RESOLUTION: The Members desire to informally resolve all disputes related to this Agreement and/or SGMA, whenever possible, at the lowest possible level, and triggering of the dispute resolution procedures described herein shall only occur where the Members and/or the Board have reached impasse and are unable to resolve matters without invoking formal dispute resolution procedures. Should informal resolution of any dispute prove unsuccessful, the Parties agree to neutral facilitation/mediation of the dispute as a next step prior to filing a lawsuit or otherwise seeking judicial intervention. The appointed facilitator/mediator, who need not be a licensed attorney, shall be a person who is not a current or former employee or agent of any Member, and someone who has knowledge of the rules governing public agencies, and who has experience with the management of groundwater resources in Southern California. The facilitator shall be compensated by the Authority.

The facilitator shall be a third party neutral assigned by the Center for Collaborative Policy ("CCP") of Sacramento State University, or such other neutral as is unanimously decided upon by the Members involved in the dispute. In the event that the Members involved in the dispute are unable to agree upon the facilitator or mediator, then each Member involved in the dispute shall provide the name of one recommended facilitator or mediator to the Authority's legal counsel. The facilitator/mediator shall then be selected by the Authority's legal counsel, based upon whichever recommended facilitator/mediator is the most qualified facilitator/mediator for the type of dispute involved. The selected facilitator/mediator shall diligently seek to achieve a consensus based solution to the dispute. Upon the request of one of the Members involved in the dispute, the facilitator shall render a recommended resolution of the dispute after five facilitated negotiation sessions between the Members involved in the dispute where an acceptable resolution has not yet been reached. The facilitator/mediator's recommended resolution shall not be admissible in any judicial proceedings. Where facilitation/mediation as described herein is unable to successfully resolve the dispute, then a Member involved in the dispute, upon providing 60 days-notice to the other Members and the Authority, may initiate judicial proceedings in the Superior Court for Riverside County.

This Section shall not bar a Member or Member(s) from initiating legal action in another appropriate forum with jurisdiction over the matter as necessary to comply with an applicable statute of limitation, provided such legal action, where authorized, is stayed pending completion of the dispute resolution process described herein. Members involved in a dispute governed by this Section are encouraged to enter a tolling agreement, if legally authorized, in order to allow sufficient time for completion of the process required by this Section.

18. WITHDRAWAL:

a. Notice to Members: Any Member may withdraw from the Authority by delivery of written notice to withdraw to each of the Members at least two years prior to the date of withdrawal ("Withdrawal Notice Period"), unless the Members unanimously agree to allow the withdrawing Member to withdraw sooner than two years, in which case the date of withdrawal shall be the date unanimously agreed upon by the Board. The withdrawing Member shall continue to be a full Member during the pendency of the Withdrawal Notice Period and shall retain all rights and obligations during such period unless otherwise agreed to by unanimous vote of the Board.

b. Effect of Withdrawal: Should a Member choose to withdraw from the Authority in accordance with the terms of this Agreement, that Member retains any legal right it has under SGMA to serve as the GSA for the groundwater basin underlying its jurisdictional boundaries, provided such withdrawal will not cause the Authority (or its remaining Members) to default on financial obligations or to otherwise fail to comply with the legal obligations imposed by SGMA. The Authority and the non-withdrawing Members shall retain whatever legal rights they have under SGMA, and the withdrawal of the Member shall have no effect on the continuance of this Agreement among the remaining Members. The withdrawing Member shall not take any action after withdrawal that would be reasonably anticipated to frustrate the ability of the Authority to comply with SGMA. After providing written notice of withdrawal, the withdrawing Member shall act at all times in good faith in the best interests of the Authority until such time as the withdrawal process is complete.

c. Continuing Fiscal Obligations: Any Member that withdraws as provided herein shall remain proportionately liable during the Withdrawal Notice Period for its proportionate share of the budget. If the Members elect to incur extraordinary costs in accordance with Section 15, the withdrawing Member shall be proportionately liable during the Withdrawal Notice Period for the obligations or debts approved and incurred by the Authority for those extraordinary costs, unless the Members agree otherwise. Any Member that withdraws shall remain proportionately liable for any unfunded capital expenditures or debt service obligations incurred or approved by the Board prior to the date of written notice of withdrawal of such Member until such time as the obligation is fully satisfied.

d. Continuing Claims Obligations: Members will remain obligated to contribute their proportionate share (based upon the membership roll as of the date of the claim), including without limitation legal defense costs, for any occurrences incurred during the Member's membership, but not presented as a claim against the Authority until after the Member's withdrawal.

e. Divisions of Property Assets: The real and/or personal property assets contributed by the withdrawing Member or the value of the real and/or personal property assets at the date of withdrawal will be returned to the withdrawing Member to the extent such assets are not required for the Authority to meet its continuing obligations as a GSA under SGMA. If such real and/or personal property assets are needed to meet the continuing obligations of the Authority to comply with SGMA, then the remaining Members of the Authority and the withdrawing Member shall negotiate a purchase or lease of such assets for a price not to exceed the fair market value of those assets.

19. TERM AND TERMINATION: This Agreement shall become effective, and the Authority shall come into existence, on the Effective Date. The Agreement, and the Authority, shall thereafter continue in full force and effect until the governing bodies of the Members unanimously elect to terminate the Agreement. Upon unanimous election to terminate this Agreement, the Board shall continue to act as a board to wind up and settle the affairs of the Authority. The Board shall adequately provide for the known debts, liabilities and obligations of the Authority, and shall then distribute the assets of the Authority among the Members, as follows:

a. The assets contributed by each Member, or the value thereof as of the date of termination, shall be distributed to that Member.

b. The remaining assets shall then be distributed to each Member in equal proportions.

The distribution of assets shall be made in-kind to the extent possible by returning to each Member those assets contributed by such parties to the Authority; however, no party shall be required to accept transfer of an asset in kind.

Notwithstanding any other provision by the Board for payment of all known debts, liabilities and obligations of the Authority, each Member shall remain liable for any and all such debts, liabilities, and obligations in equal proportions, or in the proportion specified by unanimous action of the Board if alternative proportions are so specified for particular actions or activities that give rise to such debts, liabilities, and obligations.

Termination of this Agreement shall not occur, and the Members shall continue to fund the operations of the Authority as a GSA for the Sub-Basin, until the Authority determines by a unanimous vote of the Board that: (a) a GSA is no longer required for the Sub-Basin; or (b) one or more of the individual Members will undertake the legal obligations of a GSA previously performed by the Authority, and such termination of the Authority will not result in the Sub-Basin being placed in a probationary status by the SWRCB.

20. INDEMNIFICATION/CONTRIBUTION: Members, directors, officers, agents and employees of the Authority shall use ordinary care and reasonable diligence in the exercise of their powers, and in the performance of their duties pursuant to this Agreement. The Authority shall hold harmless, defend and indemnify the Members, the Authority Board, and the Members' directors, agents, officers and employees from and against any liability, claims, actions, costs, damages or losses of any kind, including death or injury to any person and/or damage to property (including property owned by any Member), arising out of the activities or omissions of the Authority, or its agents, officers and employees related to this Agreement or SGMA ("Claims").

a. To the extent authorized by California law, no Member shall be liable for the actions or omissions of any other Member or the Authority related to this Agreement.

b. The indemnification obligations described herein shall continue beyond the term of this Agreement as to any acts or omissions occurring during this Agreement or any extension of this Agreement.

c. To the extent that the Authority is unable or unwilling (because of comparative fault of Member(s), or other good faith legal basis) to hold harmless, defend and/or indemnify any Member to this Agreement as provided in this Section, such Member shall be entitled to contribution from the other Members in equal proportion to the extent one Member pays more than its equal share of such obligation. Provided, however, that where one or more Members is determined by a court (or in a settlement approved by a court) to be responsible for a greater proportion for the Claims, each Member will only be responsible for contribution to the other Member (or Members) up to the extent of the contributing Member's proportional responsibility.

21. INSURANCE: The Authority shall obtain insurance for the Board members and general liability insurance containing liability in such amounts as the Board shall determine will be necessary to adequately insure against the risks of liability (including compliance with the indemnification provisions in Section 20 above) that may be incurred by the Authority. The Members, their officers, directors and employees, shall be named as additional insureds.

22. CLAIMS: All claims against the Authority, including, but not limited to, claims by public officers and employees for fees, salaries, wages, mileage, or any other expenses, shall be filed within the time and in the manner specified in Chapter 2 (commencing with Section 910) of Part 3, Division 3.6 of Title I of the Government Code, which describes the appropriate content of a claim.

23. ENTIRE AGREEMENT REPRESENTED: This Agreement represents the entire agreement among the parties as to its subject matter and no prior oral or written understanding shall be of any force or effect. No part of this Agreement may be modified without the written consent of all of the parties.

24. HEADINGS: Section headings are provided for organizational purposes only and do not in any manner affect the scope, meaning or intent of the provisions under the headings.

25. NOTICES: Except as may be otherwise required by law, any notice to be given shall be written and shall be either personally delivered sent by facsimile transmission, emailed or sent by first class mail, postage prepaid and addressed as follows:

MEMBERS:

City of Corona
Attn: General Manager,
Department of Water and Power
Address: 755 Public Safety Way
Corona, CA 92880

Elsinore Valley Municipal Water District
Attn: General Manager
Address: 31315 Chaney Street
Lake Elsinore, CA 92530

Temescal Valley Water District
Attn: General Manager
Address: 22646 Temescal Canyon Rd
Corona, CA 92883

Notice delivered personally is deemed to be received upon delivery. Notice sent by first class mail shall be deemed received on the fourth day after the date of mailing. Any party may change the above address by giving written notice pursuant to this Section.

26. CONSTRUCTION: This Agreement reflects the contributions of all parties and accordingly the provisions of Civil Code § 1654 shall not apply to address and interpret any uncertainty.

27. NO THIRD PARTY BENEFICIARIES INTENDED: Unless specifically set forth, the parties to this Agreement do not intend to provide any other party with any benefit or enforceable legal or equitable right or remedy.

28. WAIVERS: The failure of any party to insist on strict compliance with any provision of this Agreement shall not be considered a waiver of any right to do so, whether for that breach or any subsequent breach.

29. CONFLICT WITH LAWS OR REGULATIONS/SEVERABILITY: This Agreement is subject to all applicable laws and regulations. If any provision of this Agreement is found by any court or other legal authority, or is agreed by the parties, to be in conflict with any code or regulation governing its subject, the conflicting provision shall be considered null and void. If the effect of nullifying any conflicting provision is such that a material benefit of the Agreement to any party is lost, the Agreement may be terminated at the option of the affected party. In all other cases the remainder of the Agreement shall continue in full force and effect.

30. FURTHER ASSURANCES AND OBLIGATION OF GOOD FAITH DEALING: Each party agrees to execute any additional documents and to perform any further acts which may be reasonably required to affect the purposes of this Agreement. Moreover, consent or approval, where reasonably requested in furtherance of the purposes of this Agreement or compliance with SGMA, shall not be unreasonably withheld by a Member.

31. COUNTERPARTS: This Agreement may be signed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

32. AMENDMENT: This document may only be amended with a vote by all of its Members.

33. CUA ASSIGNMENT: To the extent that this Agreement is deemed to be a "material contract" under either of the CUA Management Agreements, the Members have no right to terminate this Agreement, either or without cause, based upon the existence or non-existence of either or both of the CUA Management Agreements. Therefore, if an applicable CUA Management Agreement expires or terminates for any reason, the Members shall remain fully obligated to perform under this Agreement contracting directly with the CUA or another third party contracted by the CUA for the maintenance, management and operation of the applicable utility systems.

CITY OF CORONA SIGNATURE PAGE
FOR
JOINT POWERS AGREEMENT BY AND AMONG THE CITY OF CORONA, ELSINORE VALLEY MUNICIPAL WATER DISTRICT AND TEMESCAL VALLEY WATER DISTRICT FOR THE FORMATION OF A JOINT POWERS AUTHORITY AND MANAGEMENT OF THE BEDFORD-COLDWATER SUB-BASIN OF THE ELSINORE BASIN

EACH OF THE UNDERSIGNED, having read and considered the above provisions, indicate their agreement by their authorized signatures.

CITY OF CORONA,
a California General Law City organized and existing under the laws of the State of California

By: ______________________
Dick Haley
Mayor

Attest:

____
Lisa Mobley
City Clerk

Approved as to Form:

____
Dean Derleth
City Attorney

Consent:

____
Darrell Talbert
Executive Director
Corona Utility Authority

ELSINORE VALLEY MUNICIPAL WATER DISTRICT SIGNATURE PAGE FOR JOINT POWERS AGREEMENT BY AND AMONG THE CITY OF CORONA, ELSINORE VALLEY MUNICIPAL WATER DISTRICT AND TEMESCAL VALLEY WATER DISTRICT FOR THE FORMATION OF A JOINT POWERS AUTHORITY AND MANAGEMENT OF THE BEDFORD-COLDWATER SUB-BASIN OF THE ELSINORE BASIN

EACH OF THE UNDERSIGNED, having read and considered the above provisions, indicate their agreement by their authorized signatures.

ELSINORE VALLEY MUNICIPAL WATER DISTRICT, a Municipal Water District organized under Water Code §§ 71000

By:____________________
Harvey R. Ryan
President, Board of Directors

ATTEST

____
Terese Quintanar
Secretary to the Board

APPROVED AS TO FORM

____
John E. Brown
General Counsel

TEMESCAL VALLEY WATER DISTRICT SIGNATURE PAGE
FOR
JOINT POWERS AGREEMENT BY AND AMONG THE CITY OF CORONA, ELSINORE VALLEY MUNICIPAL WATER DISTRICT AND TEMESCAL VALLEY WATER DISTRICT FOR THE FORMATION OF A JOINT POWERS AUTHORITY AND MANAGEMENT OF THE BEDFORD-COLDWATER SUB-BASIN OF THE ELSINORE BASIN

EACH OF THE UNDERSIGNED, having read and considered the above provisions, indicate their agreement by their authorized signatures.

TEMESCAL VALLEY WATER DISTRICT,
a California Water District organized under
California Water Code §§ 34000 et seq.

By: CWColladay
C.W. Colladay
President, Board of Directors

Attest:

Paul Rodriguez
Board Secretary

Approved as to Form:
David R. Saunders
Dave Saunders
General Counsel

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APPENDIX B

Bedford-Coldwater GSA Notice of Decision to become a Groundwater Sustainability Agency

April 20, 2017

Mark Nordberg, GSA Project Manager
Senior Engineering Geologist
California Department of Water Resources
901 P Street, Room 213A
P.O. Box 942836
Sacramento, CA 94236

Re: Notice of Election to Become a Groundwater Sustainability Agency for the Bedford-Coldwater Subbasin (Basin No. 8-.004.02)

Pursuant to California Water Code section 10723.8 of the Sustainable Groundwater Management Act (SGMA), the Bedford-Coldwater Joint Powers Authority (JPA) provides this notice of election to serve as the Groundwater Sustainability Agency (GSA) for the entire Bedford-Coldwater Subbasin (Basin No. 8-004.02) (the "Subbasin"). The JPA was formed by way of joint powers agreement among Elsinore Valley Municipal Water District, Temescal Valley Water District, and the City of Corona. The Board of Directors of the JPA approved a resolution forming the JPA on March 29, 2017.

Along with this letter and a copy of the joint powers agreement, we have also uploaded to the DWR SGMA Portal–GSA Formation Notification System a map and GIS shapefiles depicting the boundaries of the Subbasin from Bulletin 118 and the service area boundaries of the members of the JPA.

The GSA and its management area cover the entire 7,025-acre Subbasin. For planning purposes, minor portions of the Subbasin are located outside the service area boundaries of the member agencies of the JPA. The first of these areas comprises approximately 114 acres of steep, remote canyons within the Cleveland National Forest. To the JPA's knowledge, no pumping is currently occurring in the portion of the Subbasin within these canyons and it is likely that no pumping has historically or will ever occur there due to their inaccessibility and relative lack of groundwater.

A second small area consisting of approximately 44 acres outside of the JPA's boundaries is the eastern end of Dawson Canyon, which is located in the central, eastern side of the Subbasin. To the JPA's knowledge, there are only two de minimis, domestic pumpers in this area. The remote canyon has little potential for significant groundwater extraction. Notwithstanding, the GSA intends to ensure through the groundwater sustainability planning process that sustainability is reached within the SGMA statutory timeframe in the Dawson Canyon and all other areas of the Subbasin, including within the above-indicated U.S. Forest Service lands.

The JPA members have worked with the County of Riverside and the Riverside County Flood Control & Water Conservation District ("Flood Control") to obtain their support for the JPA to secure GSA status over the entire Subbasin. Support letters from the County of Riverside and Flood Control are attached. In the unlikely event that any pumping in the United States Forest Service or Dawson Canyon areas outside of the JPA's service area were to ever occur or exceed de minimis thresholds, the JPA will work with the County and Flood Control to regulate such pumping, as may be appropriate.

We have also uploaded to the DWR SGMA portal all of the other information needed to form a GSA, including copies of the JPA's Government Code section 6066 notice, the JPA resolution approving the formation of the GSA, and the list of interested parties.

Please do not hesitate to contact me with any questions you may have about this matter.

Sincerely,

Margie Armstrong
Interim Administrator
Bedford-Coldwater Joint Powers Authority

RESOLUTION NO. 2017-01

RESOLUTION OF INTENT OF THE BOARD OF DIRECTORS OF THE BEDFORD-COLDWATER GROUNDWATER SUSTAINABILITY AUTHORITY, A JOINT POWERS AUTHORITY, TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE BEDFORD COLDWATER SUB-BASIN OF THE ELSINORE GROUNDWATER BASIN

WHEREAS, in September 2014. the Sustainable Groundwater Management Act ("SGMA") was signed into law, with an effective date of January 1, 2015, and codified at California Water Code, Section 10720 et seq; and

WHEREAS, the legislative intent of SGMA is to, among other goals, provide for sustainable management of alluvial groundwater basins and sub-basins defined by the California Department of Water Resources ("DWR"), to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management, and to provide specified local agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

WHEREAS, Water Code section 10723(a) authorizes a "local agency" with water supply, water management or local land use responsibilities, or a combination of local agencies with such responsibilities overlying a groundwater basin, to decide to become a Groundwater Sustainability Agency (GSA) under SGMA; and

WHEREAS, Elsinore Valley Municipal Water District ("EVMWD"), the City of Corona ("Corona") and Temescal Valley Water District ("TVWD") jointly requested the Elsinore Basin be split into two distinct groundwater areas; and

WHEREAS, on October 11, 2016, the California Water Commission approved the subject request and established two sub-basins within the Elsinore Basin; the southerly Elsinore Valley Sub-Basin (Bulletin 118 Basin No. #8-004.1) and the northerly Bedford Coldwater Sub-Basin (#8-004.2); and

WHEREAS, Bedford Coldwater Groundwater Sustainability Authority (Authority) is a "local agency" comprised of EVMWD, Corona, and TVWD (each a "Member") with "water management" responsibilities within the Bedford-Coldwater Sub Basin (DWR Bulletin 118, No. 8-004.2) (the "Sub-Basin") of the Elsinore Groundwater Basin (DWR Bulletin 118, No. 8-004); and

WHEREAS, sustainable groundwater management of groundwater basins designated by DWR as high and medium priority basins is required by SGMA; and

WHEREAS, the boundaries of the Authority overlie the Sub-Basin, which is not adjudicated and is designated by DWR as a high priority basin; and

WHEREAS, California Water Code Section 10723.8 requires that a local agency deciding to serve as a GSA notify DWR within 30 days of the local agency's decision to become a GSA authorized to undertake sustainable groundwater management within a basin; and

WHEREAS, California Water Code Section 10723.8 mandates that 90 days following the posting by DWR of the local agency's decision to become a GSA, that entity shall be presumed to be the exclusive GSA for the area within the basin the agency is managing as described in the notice, provided that no other GSA formation notice covering the same area has been submitted to DWR; and

WHEREAS, the Authority intends to manage all portions of the Sub-Basin subject to SGMA under a groundwater sustainability plan (GSP); and

WHEREAS, in accordance with Section 10723(b) of the California Water Code, and Section 6066 of the California Government Code, a notice of public hearing was published in two general circulation newspapers in Riverside County regarding the Authority's intent to consider becoming a GSA for the Sub-Basin.

NOW, THEREFORE, THE AUTHORITY BOARD OF DIRECTORS HEREBY FINDS, DETERMINES, RESOLVES, AND ORDERS AS FOLLOWS:

SECTION 1. The above recitals, and each of them, are true and correct, and are incorporated as terms of this resolution.

SECTION 2. The Authority Board of Directors hereby decides and determines that the Authority shall become the GSA for all of those portions of the Sub-Basin that are required to be managed under SGMA.

SECTION 3. Authority staff, or staff of one of the Authority Members on behalf of the Authority, shall submit to DWR, within thirty (30) days of the approval of this Resolution, all documentation and information required by Water Code section 10723.8 to support the Authority's formation of a GSA over the Sub-Basin.

SECTION 4. The approval of this Resolution and the actions described herein are exempt from the requirements of the California Environmental Quality Act (CEQA) since: (1) they are not a "project" for purposes of CEQA (CEQA Guidelines 14 Cal. Code Regs. §15378 (b)(5)) because the approval will not will not result in direct or indirect physical changes in the environment; and (2) it can be seen with certainty that there is no possibility that the approval in question may have a significant effect on the environment. (CEQA Guidelines, 14 Cal. Code Regs. §15061(b)(3).) Staff is directed to file and post within ten (10) business days a Notice of Exemption for this approval with the Clerk of the Board of Supervisors of Riverside County.

<u>SECTION 5</u>. The Board Secretary shall certify the adoption of this resolution.

PASSED, APPROVED AND ADOPTED this 29th day of March, 2017, by the following vote:

AYES:
NOES:
ABSENT:

Chairperson

ATTEST:

Secretary

THE PRESS-ENTERPRISE

1825 Chicago Ave, Suite 100
Riverside, CA 92507
951-684-1200
951-368-9018 FAX

PROOF OF PUBLICATION
(2010, 2015.5 C.C.P)

Publication(s): The Press-Enterprise

PROOF OF PUBLICATION OF

Ad Desc.: /

I am a citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an authorized representative of THE PRESS-ENTERPRISE, a newspaper in general circulation, printed and published daily in the County of Riverside, and which newspaper has been adjudicated a newspaper of general circulation by the Superior Court of the County of Riverside, State of California, under date of April 25, 1952, Case Number 54446, under date of March 29, 1957, Case Number 65673, under date of August 25, 1995, Case Number 267864, and under date of September 16, 2013, Case Number RIC 1309013; that the notice, of which the annexed is a printed copy, has been published in said newspaper in accordance with the instructions of the person(s) requesting publication, and not in any supplement thereof on the following dates, to wit:

03/15, 03/22/2017

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date: March 22, 2017
At: Riverside, California

Legal Advertising Representative, The Press-Enterprise

TEMESCAL VALLEY WATER DISTRICT
22646 TEMESCAL CYN RD
ATTN: MEL MCCULLOUGH
CORONA, CA 92883

Ad Number: 0010914773-01

P.O. Number:

Ad Copy:

NOTICE OF PUBLIC HEARING TO CONSIDER THE ELECTION BY THE BEDFORDCOLDWATER GROUNDWATER SUSTAINABILITY AUTHORITY TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE BEDFORD COLDWATER SUBBASIN OF THE ELSINORE BASIN

NOTICE IS HEREBY GIVEN pursuant to Section 10723(b) of the California Water Code and Section 6066 of the California Government Code that the Board of Directors ("Board") of the Bedford-Coldwater Groundwater Sustainability Authority will hold a public hearing to consider the proposed decision by Bedford-Coldwater Groundwater Sustainability Authority to become the Groundwater Sustainability Agency ("GSA") for the BedfordColdwater Subbasin (#8-004.02) of the Elsinore Basin (#8-004) on Wednesday, March 29, 2017 at 4 p.m., in the Boardroom of Temescal Valley Water District's headquarters, located at 22646 Temescal Canyon Road, Temescal Valley, California 92883.

The purpose of the public hearing will be to hear comments from the public regarding the Bedford-Coldwater Groundwater Sustainability Authority's proposed formation of a GSA within its boundaries in the Bedford-Coldwater Subbasin (#8-004.02).

At the end of the public hearing, the Board may adopt, revise or modify a Resolution of Intent to become the GSA and to submit notification to the California Department of Water Resources ("DWR"), which shall post the notice pursuant to Section 10723.8(b) of the California Water Code. The notification submitted to DWR will include a description of the proposed boundaries of the GSA and the Subbasin that the Bedford-Coldwater Groundwater Sustainability Authority intends to manage pursuant to the Sustainable Groundwater Management Act ("SGMA").

The draft Resolution of Intent is on file and available for inspection during regular business hours at the office of the Temescal Valley Water District at 22646 Temescal Canyon Road, Temescal Valley, California 92883.

To publish March 15, 2017 and March 22, 2017.

PROOF OF PUBLICATION

THIS SPACE RESERVED FOR CLERK / RECORDING STAMP

CITY OF CORONA

NOTICE OF PUBLIC HEARING TO CONSIDER THE ELECTION BY THE BEDFORD-COLDWATER GROUNDWATER SUSTAINABILITY AUTHORITY TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE BEDFORD COLDWATER SUBBASIN OF THE ELSINORE BASIN

NOTICE IS HEREBY GIVEN pursuant to Section 10723(b) of the California Water Code and Section 6066 of the California Government Code that the Board of Directors ("Board") of the Bedford-Coldwater Groundwater Sustainability Authority will hold a public hearing to consider the proposed decision by Bedford-Coldwater Groundwater Sustainability Authority to become the Groundwater Sustainability Agency ("GSA") for the Bedford-Coldwater Subbasin (#8-004.02) of the Elsinore Basin (#8-004) on WEDNESDAY, MARCH 29, 2017 AT 4 P.M., in the Boardroom of Temescal Valley Water District's headquarters, located at 22646 Temescal Canyon Road, Temescal Valley, California 92883.

The purpose of the public hearing will be to hear comments from the public regarding the Bedford-Coldwater Groundwater Sustainability Authority's proposed formation of a GSA within its boundaries in the Bedford-Coldwater Subbasin (#8-004.02).

At the end of the public hearing, the Board may adopt, revise or modify a Resolution of Intent to become the GSA and to submit notification to the California Department of Water Resources ("DWR"), which shall post the notice pursuant to Section 10723.8(b) of the California Water Code. The notification submitted to DWR will include a description of the proposed boundaries of the GSA and the Subbasin that the Bedford-Coldwater Groundwater Sustainability Authority intends to manage pursuant to the Sustainable Groundwater Management Act ("SGMA").

The draft Resolution of Intent is on file and available for inspection during regular business hours at the office of the Temescal Valley Water District at 22646 Temescal Canyon Road, Temescal Valley, California 92883.

Published: March 15, 2017 and March 22, 2017.

JOB CC17-025

SENTINEL WEEKLY NEWS

"Adjudicated for City of Corona, Corona Judicial Dist., Riverside County, California"

SWN-2511 JOB CC17-025

MARCH 15, 22, 2017

Sentinel Weekly News

Adjudicated for the City of Corona, California

1307-C West 6th St., Suite 139

Corona, CA. 92882

Tel: (951) 737-9784 / Fax: (951) 737-9785

E-mail: SentinelWeekly@aol.com

PROOF OF PUBLICATION

(2010, 2015.5 C.C.P.)

STATE OF CALIFORNIA

COUNTY OF RIVERSIDE

I am a Citizen of the United States. I am over the age of eighteen years and not a party to or interested in the above entitled matter. I am an Authorized Representative of *SENTINEL WEEKLY NEWS* (formerly known as The Lake Mathews Sentinel), a Newspaper of General Circulation, printed and published weekly in the City of Corona, County of Riverside, and which Newspaper has been Adjudicated a Newspaper of General Circulation by the Superior Court of the County of Riverside, State of California, under the date of March 30, 1995, Case Number 262254; and under the date of December 7, 1999, Case Number 334071; and the Notice, of which the annexed is a printed copy, has been published in said Newspaper in accordance with the instructions of the Person(s) requesting publication, and not in any supplement thereof on the following dates to wit:

(1) ***March 22, 2017***

(2)

(3)

(4)

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

/S/ ______________________________

Authorized Representative

DATED: __ ***MARCH 22, 2017*** __

APPENDIX C

GSP Elements Guide

Article 5. **Plan Contents for Bedford-Coldwater Basin**

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
§ 354.			**Introduction to Plan Contents**					
			This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
SubArticle 1.			**Administrative Information**					
§ 354.2.			**Introduction to Administrative Information**					
			This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.4.			**General Information**					
			Each Plan shall include the following general information:					
(a)			An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin.		ES			
(b)			A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public.		10			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
§ 354.6.			**Agency Information**					
			When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information:					
(a)			The name and mailing address of the Agency.		1.3			
(b)			The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan.		1.3.1			
(c)			The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager.		1.3.1			
(d)			The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan.		1.3.2			
(e)			An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs.		1.3.3			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code.					
§ 354.8.			**Description of Plan Area**					
			Each Plan shall include a description of the geographic areas covered, including the following information:					

Article 5. **Plan Contents for Bedford-Coldwater Basin**

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(a)			One or more maps of the basin that depict the following, as applicable:					
	(1)		The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins.		2.1	Figure 1-1		
	(2)		Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative.		2.1.2	Figure 2-2		
	(3)		Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans.		2.1.2	Figure 2-1, 2-2		
	(4)		Existing land use designations and the identification of water use sector and water source type.		2.1.3 and 2.1.5	Figure 2-8, 2-9		
	(5)		The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information.		2.1.2.1	Figures 2-3,2-4, 2-5, 2-6		
(b)			A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map.		2.1	Figure 2-1, 2-2		
(c)			Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan.		2.1.4			
(d)			A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits.		2.1.4			Additional text?
(e)			A description of conjunctive use programs in the basin.		2.1.4			
(f)			A plain language description of the land use elements or topic categories of applicable general plans that includes the following:					
	(1)		A summary of general plans and other land use plans governing the basin.		2.1.5	Figure 2-8, 2-9		
	(2)		A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects		2.1.5			
	(3)		A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon.		2.1.5			
	(4)		A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans.		2.1.5			

Article 5.			Plan Contents for Bedford-Coldwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(5)		To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management.		2.1.5			
(g)			A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate.					none determined to be appropriate
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code.					
§ 354.10.			**Notice and Communication**					
			Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following:					
(a)			A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties.		3.10, 6.2.4, 6.3.4, 6.5.4, 6.6.4, 6.6.7, Appendix D			
(b)			A list of public meetings at which the Plan was discussed or considered by the Agency.		Appendix J			
(c)			Comments regarding the Plan received by the Agency and a summary of any responses by the Agency.		Appendix J			none received yet
(d)			A communication section of the Plan that includes the following:					
	(1)		An explanation of the Agency's decision-making process.		Appendix B			
	(2)		Identification of opportunities for public engagement and a discussion of how public input and response will be used.		Appendix D			
	(3)		A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin.		Appendix D			
	(4)		The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions.		Appendix D			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code					
SubArticle 2.			**Basin Setting**					
§ 354.12.			**Introduction to Basin Setting**					

Article 5.			Plan Contents for Bedford-Coldwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.14.			**Hydrogeologic Conceptual Model**					
(a)			Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin.		3	Figures 3-1 through 3-10		
(b)			The hydrogeologic conceptual model shall be summarized in a written description that includes the following:					
	(1)		The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency.		3.4 and 3.5	Figures 3-1 through 3-5		
	(2)		Lateral basin boundaries, including major geologic features that significantly affect groundwater flow.		3.5, 3.6, and 3.9	Figure 3-5		
	(3)		The definable bottom of the basin.		3.7	Figure 3-6		
	(4)		Principal aquifers and aquitards, including the following information:					
		(A)	Formation names, if defined.		3.6.1	Figure 3-5		
		(B)	Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information.		3.4, 3.5, 3.6, 3.7, 3.8, 3.9, and Appendix E	Figure 3-5, Appendix E		
		(C)	Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features.		3.4, 3.5, 3.6, 3.7, 3.8, 3.9, and Appendix E	Figure 3-5		
		(D)	General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs.		4.4 and 4.5			
		(E)	Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply.		3.11			
	(5)		Identification of data gaps and uncertainty within the hydrogeologic conceptual model		3.12			

Article 5.			Plan Contents for Bedford-Coldwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(c)			The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin.		3.8	Figure 3-7 through 3-9		
(d)			Physical characteristics of the basin shall be represented on one or more maps that depict the following:					
	(1)		Topographic information derived from the U.S. Geological Survey or another reliable source.			Figure 3-1		
	(2)		Surficial geology derived from a qualified map including the locations of cross-sections required by this Section.			Figure 3-5		
	(3)		Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies.			Figure 3-4		
	(4)		Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin.			Figure 3-10		
	(5)		Surface water bodies that are significant to the management of the basin.			Figure 3-2		
	(6)		The source and point of delivery for imported water supplies.		2.1.2.1	Figure 2-7		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10733, and 10733.2, Water Code.					
§ 354.16.			**Groundwater Conditions**					
			Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following:					
(a)			Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including:					
	(1)		Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin.			Figure 4-7 and Figure 4-8		
	(2)		Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers.			Figure 4-2 and Figure 4-6		
(b)			A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type.			Figure 5-6		
(c)			Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer.		4.8			
(d)			Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes.		4.4, 4.5, 4.6, 4.7	Figure 4-11 through 4-13		

Article 5.			Plan Contents for Bedford-Coldwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(e)			The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information.		4.3	Figure 4-9 and 4-10		
(f)			Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information.		4.9	Figures 4-14 through 4-19		
(g)			Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information.		4.9	Figures 4-20 through 4-22		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code.					
§ 354.18.			**Water Budget**					
(a)			Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form.		5.1, 5.5	Figure 5-5 and 5-6		
(b)			The water budget shall quantify the following, either through direct measurements or estimates based on data:					
	(1)		Total surface water entering and leaving a basin by water source type.		5.6	Figure 5-5	Table 5-3	
	(2)		Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems.		5.7.1	Figure 5-6	Table 5-4	
	(3)		Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow.		5.7.2	Figure 5-6	Table 5-4	
	(4)		The change in the annual volume of groundwater in storage between seasonal high conditions.		5.8, Appendix H	Figure 5-6	Table 5-4	
	(5)		If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions.		NA			
	(6)		The water year type associated with the annual supply, demand, and change in groundwater stored.		5.2	Figure 5-1		
	(7)		An estimate of sustainable yield for the basin.		5.9		Table 5-5	
(c)			Each Plan shall quantify the current, historical, and projected water budget for the basin as follows:					
	(1)		Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information.		5.7	Figure 5-6	Table 5-4	

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following:					
		(A)	A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information.		5.7, Appendix H	Figure 5-5	Table 5-4	
		(B)	A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon.		5.7, Appendix H	Figure 5-6	Table 5-4	
		(C)	A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type.		5.7, 5.9	Figure 5-6, Figure 5-1	Table 5-4	
	(3)		Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon:					
		(A)	Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise.		5.5.3, 5.6, 5.7	Figures 5-7,5-8,5-10		
		(B)	Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate.		5.5, 5.7	Figures 5-7,5-8,5-10	Table 5-2	
		(C)	Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate.		5.5, 5.6, 5.7, Appendix H	Figures 5-7,5-8,5-10		

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
(d)			The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget:					
	(1)		Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use.		5.2, Appendix H	Figure 5-6		
	(2)		Current water budget information for temperature, water year type, evapotranspiration, and land use.		5.2,5.3, Appendix H	Figure 5-6		
	(3)		Projected water budget information for population, population growth, climate change, and sea level rise.		5.5.3, Appendix H	Figure 5-7 and 5-8		
(e)			Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions.		5.5, 5.6, 5.7, 5.8, Appendix H			
(f)			The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4.		5.1, Appendix E			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code.					
§ 354.20.			**Management Areas**					
(a)			Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin.		5.4	Figure 5-2		
(b)			A basin that includes one or more management areas shall describe the following in the Plan:					
	(1)		The reason for the creation of each management area.		5.4, Appendix G			
	(2)		The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large.		6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7			

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(3)		The level of monitoring and analysis appropriate for each management area.		7			
	(4)		An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable.		6			
(c)			If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas.		5.4	Figure 5-2		
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10733.2 and 10733.4, Water Code.					
SubArticle 3.			**Sustainable Management Criteria**					
§ 354.22.			**Introduction to Sustainable Management Criteria**					
			This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.24.			**Sustainability Goal**					
			Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon.		6.1.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.26.			**Undesirable Results**					
(a)			Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin.		6.1.1, 6.2.1, 6.3.1, 6.5.1, 6.6.1, 6.7.1			
(b)			The description of undesirable results shall include the following:					
	(1)		The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate.		6.1.2, 6.2.2, 6.3.2, 6.5.2, 6.6.2, 6.7.2			

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(2)		The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin.		6.1.3, 6.2.3, 6.3.3, 6.5.3, 6.6.3, 6.7.3			
	(3)		Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results.		6.1.4, 6.2.4, 6.3.4, 6.5.4, 6.6.4, 6.7.4			
(c)			The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site.		6.2.5, 6.3.5, 6.5.5, 6.6.5, 6.7.5			
(d)			An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators.		6.4			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code.					
§ 354.28.			**Minimum Thresholds**					
(a)			Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			
(b)			The description of minimum thresholds shall include the following:					
	(1)		The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting.		6.2.5, 6.3.5, 6.5.5, 6.6.5, 6.7.5			
	(2)		The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			

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	(3)		How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			
	(4)		How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			
	(5)		How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			
	(6)		How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4.		6.2.6, 6.3.6, 6.5.6, 6.6.6, 6.7.6			
(c)			Minimum thresholds for each sustainability indicator shall be defined as follows:					
	(1)		Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following:					
		(A)	The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin.		4.1.3, 6.2	Figure 4-3, 4-4, 4-5, 4-6, 6-1		
		(B)	Potential effects on other sustainability indicators.		6.3.6.1			
	(2)		Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin.		6.3			
	(3)		Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following:					
		(A)	Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer.		6.4			
		(B)	A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels.		6.4			

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	(4)		Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin.		6.5			
	(5)		Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following:					
		(A)	Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects.		6.6			
		(B)	Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives.		6.6	Figure 4-10		
	(6)		Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following:					
		(A)	The location, quantity, and timing of depletions of interconnected surface water.		6.7	Figures 6-2 through 6-5		
		(B)	A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph.		6.7.5	Figures 6-2 through 6-5		
(d)			An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence.		6.3			
(e)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators.		6.4			
			Note: Authority cited: Section 10733.2, Water Code.					

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			Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code.					
§ 354.30.			**Measurable Objectives**					
(a)			Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon.		6.2.7, 6.3.7, 6.5.7, 6.6.7, 6.7.7			
(b)			Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds.		6.2.7, 6.3.7, 6.5.7, 6.6.7, 6.7.7			
(c)			Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty.		6.2.7, 6.3.7, 6.5.7, 6.6.7, 6.7.7			
(d)			An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence.		6.3.7			
(e)			Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon.		6.1			
(f)			Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin.		6.2.7, 6.3.7, 6.5.7, 6.6.7, 6.7.7			
(g)			An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan.		6.2.7, 6.3.7, 6.5.7, 6.6.7, 6.7.7			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					
SubArticle 4.			**Monitoring Networks**					
§ 354.32.			**Introduction to Monitoring Networks**					

Article 5.			Plan Contents for Bedford-Coldwater Basin	GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.34.			**Monitoring Network**					
(a)			Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation.		7.1		Table 7-1	
(b)			Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following:					
	(1)		Demonstrate progress toward achieving measurable objectives described in the Plan.		7.1		Table 7-1	
	(2)		Monitor impacts to the beneficial uses or users of groundwater.		7.1		Table 7-1	
	(3)		Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds.		7.1		Table 7-1	
	(4)		Quantify annual changes in water budget components.		7.1		Table 7-1	
(c)			Each monitoring network shall be designed to accomplish the following for each sustainability indicator:					
	(1)		Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods:					
		(A)	A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer.		7.1.1	Figure 7-1	Table 7-2	
		(B)	Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions.		7.1.1	Figure 7-1	Table 7-2	
	(2)		Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage.		7.1.2			
	(3)		Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated.		7.1.3			

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				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
	(4)		Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues.		7.1.5	Figure 7-2	Table 7-2	
	(5)		Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method.		7.1.4			
	(6)		Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following:					
		(A)	Flow conditions including surface water discharge, surface water head, and baseflow contribution.		7.1.6			
		(B)	Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable.		7.1.6			
		(C)	Temporal change in conditions due to variations in stream discharge and regional groundwater extraction.		7.1.6			
		(D)	Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water.		7.1.6			
(d)			The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area.		7.1	Figure 7-1 and 7-2		
(e)			A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network.		7.1		Table 7-1	
(f)			The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors:					
	(1)		Amount of current and projected groundwater use.		7.1			
	(2)		Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow.		7.1			
	(3)		Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal.		7.1			
	(4)		Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response.		7.1			
(g)			Each Plan shall describe the following information about the monitoring network:					
	(1)		Scientific rationale for the monitoring site selection process.		7.1			

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	(2)		Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained.		7.2			
	(3)		For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36.		7.1			
(h)			The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used.		7.1			
(i)			The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies.		7.2			
(j)			An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators.		7.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code					
§ 354.36.			**Representative Monitoring**					
			Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows:					
(a)			Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined.		7.3			
(b)			(b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following:					
	(1)		Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy.		7.3			
	(2)		Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy.		7.3			
(c)			The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area.		7.3			

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			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2 and 10733.2, Water Code					
§ 354.38.			**Assessment and Improvement of Monitoring Network**					
(a)			Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin.		7.5		Table 7-3	
(b)			Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency.		7.5		Table 7-3	
(c)			If the monitoring network contains data gaps, the Plan shall include a description of the following:					
	(1)		The location and reason for data gaps in the monitoring network.				Table 7-3	
	(2)		Local issues and circumstances that limit or prevent monitoring.		7.5		Table 7-3	
(d)			Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites.		7.5		Table 7-3	
(e)			Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following:					
	(1)		Minimum threshold exceedances.		7.1			
	(2)		Highly variable spatial or temporal conditions.		7.1			
	(3)		Adverse impacts to beneficial uses and users of groundwater.		7.1			
	(4)		The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin.		7.1			
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code					
§ 354.40.			**Reporting Monitoring Data to the Department**					
			Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department.					
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10728, 10728.2, 10733.2, and 10733.8, Water Code.					
SubArticle 5.			**Projects and Management Actions**					
§ 354.42.			**Introduction to Projects and Management Actions**					
			This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon.					

				GSP Document References				
				Page Numbers of Plan	Or Section Numbers	Or Figure Numbers	Or Table Numbers	Notes
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Section 10733.2, Water Code.					
§ 354.44.			**Projects and Management Actions**					
(a)			Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin.		8			
(b)			Each Plan shall include a description of the projects and management actions that include the following:					
	(1)		A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following:					
		(A)	A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
		(B)	The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(2)		If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft.		NA			
	(3)		A summary of the permitting and regulatory process required for each project and management action.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(4)		The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(5)		An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(6)		An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(7)		A description of the legal authority required for each project and management action, and the basis for that authority within the Agency.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	

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	(8)		A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
	(9)		A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
(c)			Projects and management actions shall be supported by best available information and best available science.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
(d)			An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions.		8.1,8.2,8.3, 8.4,8.5,8.6, 8.7,8.8		Tables 8-1 through 8-8	
			Note: Authority cited: Section 10733.2, Water Code.					
			Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code.					

APPENDIX D

BCGSA Stakeholder Outreach Plan

STAKEHOLDER OUTREACH PLAN

BEDFORD COLDWATER GROUNDWATER SUBBASIN (#8-004.02) of the ELSINORE BASIN (#8-004)

RIVERSIDE COUNTY, CALIFORNIA

SUSTAINABLE GROUNDWATER MANAGEMENT ACT

(SGMA) PROGRAM

Prepared For:

BEDFORD COLDWATER
GROUNDWATER SUSTAINABILITY AUTHORITY

Acting as a Groundwater Sustainability Agency

Prepared By:

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October 2018

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LIST OF ACRONYMS AND ABBREVIATIONS

BCGSA	Bedford Coldwater Groundwater Sustainability Authority acting as a Groundwater Sustainability Agency
CASGEM	California Statewide Groundwater Elevation Monitoring
Corona	City of Corona
DAC	disadvantaged community
DWR	California Department of Water Resources
EVMWD	Elsinore Valley Municipal Water District
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
JPA	Joint Powers Authority
SGMA	Sustainable Groundwater Management Act
TVWD	Temescal Valley Water District

1.0 INTRODUCTION

The Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, was enacted in California to regulate and sustainably manage groundwater basins throughout the state. SGMA provides a framework to guide local public agencies and newly created Groundwater Sustainability Agencies (GSAs) in the management of their underlying groundwater basins, especially those considered critically affected as defined by the Department of Water Resources (DWR).

The Bedford Coldwater Groundwater Sustainability Authority (BCGSA) was formed as a result of a Joint Powers Agreement to create a Joint Powers Authority (JPA). The JPA consists of the City of Corona (Corona), Elsinore Valley Municipal Water District (EVMWD), and Temescal Valley Water District (TVWD) acting as the Groundwater Sustainability Agency (GSA) for the Bedford Coldwater Groundwater Subbasin (Subbasin), a subbasin of the Elsinore Groundwater Basin. The BCGSA will be responsible for creating a Groundwater Sustainability Plan (GSP) to achieve long-term groundwater sustainability in the Subbasin. Under SGMA Regulations (California Water Code [Water Code] Section 10723.2), the BCGSA must consider all beneficial users and users of groundwater throughout the GSP development process. The BCGSA, comprised of three local agencies, will strive to achieve sustainable groundwater management in the region in the best interests of the stakeholders and local community.

This Stakeholder Outreach Plan (Outreach Plan) outlines the communication methods and strategies the BCGSA will employ to most effectively engage and involve stakeholders throughout GSP development and SGMA implementation per California Water Code.

2.0 OBJECTIVES

The purpose of this Outreach Plan is to involve stakeholders and understand their values throughout development of the GSP for the Subbasin. The objectives of the Outreach Plan are to:

- Identify and include interested stakeholders, including: affected governments, agencies, land use and environmental organizations, interested parties, and members of the public
- Provide multiple forums for stakeholder involvement
- Encourage stakeholder input throughout the GSP development process
- Receive and understand information about stakeholders' values and interests
- Incorporate comments and feedback received during GSP development
- Abide by SGMA Regulations and ensure broad public participation and transparency

3.0 STAKEHOLDER IDENTIFICATION

SGMA Regulations require GSAs to consider the interests of all beneficial users and users of groundwater (Water Code Section 10723.2), and establish and maintain a list of persons interesting in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents (Water Code Section 10723.4). Per Water Code Section 10723.8(a)(4), a list of interested parties was developed and provided to

DWR during formation of the BCGSA. The BCGSA will continue to expand this list throughout the GSP development process. An initial list of stakeholders is presented in Table 1.

Table 1 – List of Stakeholders in the BCGSA Area

Category	Identified Stakeholders
Holders of overlying groundwater rights – Agricultural users	None identified
Holders of overlying groundwater rights – Domestic well owners	• Golf Club at Glen Ivy • Shea Homes, Inc. • Other small producers
Municipal well operators	• City of Corona Department of Water and Power • Elsinore Valley Municipal Water District • Temescal Valley Water District
Industrial well operators	• Coldwater Aggregates
Public water systems	• Western Municipal Water District • Eastern Municipal Water District • City of Corona Department of Water and Power • Elsinore Valley Municipal Water District • Temescal Valley Water District
Local land use planning agencies	• Riverside County, Planning Department • City of Corona
Regulatory Agencies	• Riverside County Flood Control and Water Conservation District • California Regional Water Quality Control Board – Santa Ana Region (8)
Environmental Groups	• The Nature Conservatory
Surface water users, if there is a hydrologic connection between surface and groundwater bodies	• Santa Ana Watershed Protection Agency • City of Corona Department of Water and Power • Elsinore Valley Municipal Water District • Temescal Valley Water District
The Federal Government	• United States Forest Service • United States Fish and Wildlife Service
California State Agencies	• California Department of Water Resources • California Department of Fish and Wildlife Groundwater Program
California Native American Tribes	• Soboba Band of Luiseño Indians • Rincon Band of Luiseño Indians • Agua Caliente Band of Cahuilla Indians • Temecula Band of Luiseño Indians
Disadvantaged communities (DAC), including, but not limited to, those served by private domestic wells or small community water systems	None identified

Entities listed in Water Code Section 10927 that are monitoring and reporting groundwater elevations in all or a part of a groundwater basin managed by the groundwater sustainability agency	Elsinore Valley Municipal Water District is the entity responsible for the California Statewide Groundwater Elevation Monitoring (CASGEM) program

4.0 OUTREACH ACTIVITIES

The BCGSA will implement the following outreach activities to maximize stakeholder involvement during development and implementation of the GSP. A summary of SGMA stakeholder outreach requirements and Water Code sections (Dobbin, 2015) are included in Table A.1 of Appendix A.

4.1 Public Notices and Meetings

SGMA establishes public notice requirements for GSAs to ensure that the general public and other stakeholders, are aware of actions by their local GSA. Table 2 outlines the three sections of the Water Code that require public notice, including before establishing a GSA, before adopting or amending a GSP, and before imposing or increasing a fee.

Table 2 – SGMA Requirements for Public Notice

Public Notice Requirement	Water Code Section
"Before deciding to become a groundwater sustainability agency, and after publication of notice pursuant to Section 6066 of the Government Code, the local agency or agencies shall hold a public hearing in the county or counties overlying the basin."	10723(b)
"A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing, held at least 90 days after providing notice to a city or county within the area of the proposed plan or amendment."	10728.4
"Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting, at which oral or written presentations may be made as part of the meeting."	10730(b)(1)

The BCGSA will satisfy these requirements by publishing notices in local news outlets for Riverside County (*The Press-Enterprise)* and the City of Corona (*Sentinel Weekly News)*, as well as posting on the BCGSA website.

In accordance with Water Code Section 10723(b), the following notices were provided to the public during formation of the BCGSA:

- On March 15, 2017 and March 22, 2017, a notice of public hearing was published in *The Press-Enterprise* and *Sentinel Weekly News* to inform the public of the intent to hold a public hearing to consider the proposed decision by Bedford-Coldwater Groundwater Sustainability Authority to become the GSA for the Bedford-Coldwater Subbasin of the Elsinore Basin.

- On March 29, 2017, the Bedford-Coldwater Groundwater Sustainability Authority held a public hearing in the Boardroom of the Temescal Valley Water District's headquarters to hear comments from the public regarding the Bedford-Coldwater Groundwater Sustainability Authority's proposal to form a GSA within the Bedford-Coldwater Subbasin.

4.1.1 Public Meetings

To promote broad public participation and stakeholder involvement (Water Code Section 10727.8(a)), the BCGSA will conduct at least two public meetings during development of the GSP. Each meeting will be open to stakeholders and will include agency representatives. These meetings will be an opportunity for stakeholders to ask questions and provide input on sections of the GSP.

Public meetings will be held in the Boardroom of the Temescal Valley Water District's headquarters, located at 22646 Temescal Canyon Road, Temescal Valley, California 92883. More information including date and time of upcoming meetings will be provided on the BCGSA website. Throughout stakeholder outreach, the BCGSA will evaluate if additional accommodations will be necessary (e.g., evening meetings, translation for hearing impaired or non-English speaking individuals, etc.) in order to include as many stakeholders as possible[1].

4.1.2 JPA Board Meetings

Representatives of each agency comprising the BCGSA will be present during quarterly Board meetings with the JPA. The dates, times, and location of these meetings will be posted on the BCGSA website. Time is designated during these meetings for the BCGSA to provide the JPA with updates on the progress of GSP development and SGMA implementation. There will be opportunity for the public to pose questions and comments at the start of each meeting.

4.2 GSA Website

The BCGSA will develop a website to facilitate the sharing of information about GSP development and SGMA implementation with stakeholders. Information will include maps, a calendar of upcoming meetings and important dates, meeting summaries, groundwater information, relevant documents, mailing list signup, and other SGMA/GSA related information. The BCGSA website is located at: www.bedfordcoldwatergsa.com

The website will be updated regularly. There will be a designated page where users are encouraged to request more information, ask questions, or be added to the list of stakeholders. Links to the BCGSA website will be provided on the homepages of member agency websites.

Prior to initiating the development of a GSP, SGMA Regulations require that GSAs make a written statement describing the manner in which interested parties may participate in the development and implementation of the GSP available to the public and to DWR (Water Code Section 10727.8(a)). A section of the BCGSA website will allow the public to access this statement, the Outreach Plan, and any other written requirements.

[1] Public meetings may be held remotely via the internet as a result of Covid-19 safety precautions.

4.3 Direct Mailings/Email

The BCGSA will maintain and continue to update a list of stakeholders. The list will be updated as persons request information though the website and from attendance at public meetings. Information distributed to those on the list who are interested in receiving BCGSA updates may include, plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents (Water Code Section 10723.4).

4.4 Outreach Implementation Timeline

Stakeholder engagement opportunities will be tracked and available on the BCGSA website throughout the GSP development process. Figure 1 shows the required stakeholder engagement opportunities throughout the four phases of GSP development as described by DWR (DWR, 2018). Forms of stakeholder engagement may include public meetings, information distributed to the BCGSA list of stakeholders, or DWR open public comment periods online via the SGMA Portal found at https://sgma.water.ca.gov/portal/#intro.

Phase 1 (years 2015 to 2017) is the GSA Formation and Coordination phase and includes one stakeholder input requirement. This requirement was completed by holding a public hearing to form the GSA from the Bedford Coldwater Groundwater Sustainability Authority.

Phase 2 (year 2017 to 2022) is the GSP Preparation and Submission part of the GSP development process. During this phase, stakeholders will be provided with opportunities to provide input on sections of the GSP by attending public meetings or reaching out on the BCGSA website.

Phase 3, occurring at any point after completion of Phase 2, consists of GSP review and evaluation. Once the GSP is submitted, any person may provide comments to DWR regarding a proposed or adopted GSP via the SGMA Portal found on DWR's website.

Phase 4 (year 2022+) is the Implementation and Reporting phase following adoption of the GSP. Active stakeholder involvement and public meetings are encouraged by DWR during this phase.

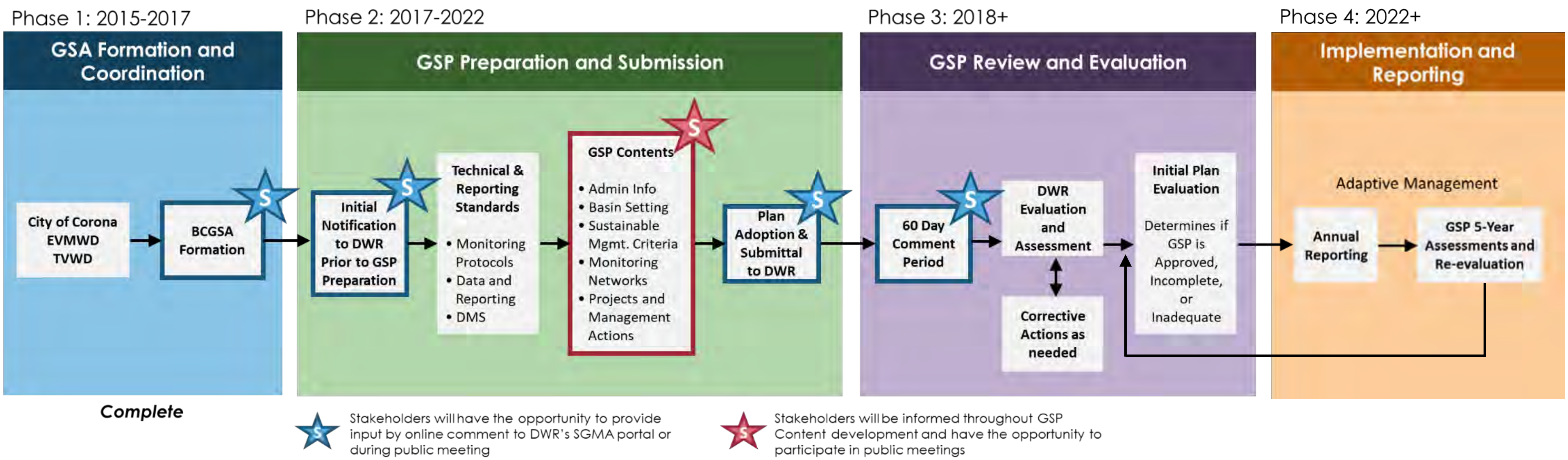

Figure 1 – Stakeholder Input Timeline (adapted from DWR, 2018)

5.0 EVALUATION

GSAs are encouraged to continually evaluate the effectiveness and monitor the progress of stakeholder engagement. The BCGSA will monitor the effectiveness of the Outreach Plan throughout GSP development and implementation by actively revising and updating the Outreach Plan to reflect any changing needs of stakeholders. The stakeholders list will be updated as needed to ensure all interested groups and beneficial users are included.

5.1 Public Meeting Participation and Attendance

Recording attendance and participation at public meetings is one method the BCGSA will use to implement the Outreach Plan and identify any adjustments that may be required. A record of attendance will be taken at each public meeting, and written feedback request forms will be available to each attendee. The forms will allow a clear pathway for the BCGSA to receive direct feedback on how to improve engagements with the public, if necessary, and to ensure individual interests are documented and considered.

5.2 Comment and Response Database

The BCGSA will maintain a database in order to ensure that comments voiced during public meetings and throughout stakeholder engagement are addressed. The database will track comments (and other information including name, date, and venue), assign responsibility for response preparation, and track distribution of responses. A copy of the information contained in the database will be included in the GSP as required by GSP Regulations Section 354.10.

6.0 REFERENCES

California Department of Water Resources (DWR), 2018. “Guidance Document for Groundwater Sustainability Plan, Stakeholder Communication and Engagement.” Sustainable Groundwater Management Program. January.

Dobbin, Kristin, et al., 2015. “Collaborating for Success: Stakeholder Engagement for Sustainable Groundwater Management Act Implementation.” Community Water Center. July.

Water Code Sections can be found online at California Legislative Information. <https://leginfo.legislature.ca.gov/faces/home.xhtml>

APPENDIX A

Summary of Statutory Requirements

Table A.1 – Summary of Statutory Requirements for Stakeholder Engagement in SGMA

Timeframe	Requirement	California Water Code Section
During GSA Formation	"Before electing to be a groundwater sustainability agency… the local agency or agencies shall hold a public hearing"	10723 (b)
	"A list of interested parties [shall be] developed [along with] an explanation of how their interests will be considered"	10723.8(a)(4)
During GSP Development and Implementation	"A groundwater sustainability agency may adopt or amend a groundwater sustainability plan after a public hearing"	10728.4
	"Prior to imposing or increasing a fee, a groundwater sustainability agency shall hold at least one public meeting"	10730(b)(1)
	"The groundwater sustainability agency shall establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements, and availability of draft plans, maps, and other relevant documents"	10723.4
	"Any federally recognized Indian Tribe… may voluntarily agree to participate in the preparation or administration of a groundwater sustainability plan or groundwater management plan… A participating Tribe shall be eligible to participate fully in planning, financing, and management under this part"	10720.3(c)
	"Prior to initiating the development of a groundwater sustainability plan, the groundwater sustainability agency shall make available to the public and the department a written statement describing the manner in which interested parties may participate in the development and implementation of the groundwater sustainability plan"	10727.8(a)
Throughout SGMA Implementation	"The groundwater sustainability agency shall consider the interests of all beneficial uses and users of groundwater"	10723.2
	"The groundwater sustainability agency shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin"	10727.8(a)

APPENDIX E

Bedford-Coldwater GSP Numerical Groundwater Model Documentation Report

BEDFORD COLDWATER
Groundwater Sustainability Authority

BEDFORD-COLDWATER BASIN GROUNDWATER SUSTAINABILITY PLAN

DRAFT
GROUNDWATER MODEL DOCUMENTATION REPORT

May 2021

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1. INTRODUCTION

The groundwater model was developed to support the Groundwater Sustainability Plan (GSP) for the Bedford-Coldwater Subbasin of the Elsinore Groundwater Basin (DWR Groundwater Basin 8-004.02) and is prepared in accordance with Sustainable Groundwater Management Act (SGMA). For convenience, DWR Basin 8-004.02 will be referred to as the Bedford-Coldwater Subbasin (Basin) in this memo.

1.1. SCOPE AND OBJECTIVE

SGMA effectively requires that groundwater modeling be used to demonstrate that a GSP will achieve sustainable basin operation. Various numerical model that has been developed, periodically updated, and used for various scenarios since the 1990s. The objective of this model was to simulate the surface water and groundwater model for the entire Basin that updates key parameters the Basin boundary, discretization, geologic layering, aquifer parameter distribution. The assessment and final model focuses on applicability to SGMA GSP regulations including consistency with DWR Best Management Practices for surface water and groundwater modeling (DWR, 2016). This comprehensive groundwater model serves as a quantitative tool for computing Basin-wide and management area specific water budgets as required by the SGMA GSP regulations.

1.2. SUMMARY OF PREVIOUS MODELS

The Basin Model (Bedford-Coldwater Model) incorporates the hydrologic, geologic and groundwater data to develop a numerical groundwater model to evaluate local water budgets and assess sustainability criteria. An earlier groundwater model was developed for use on the Coldwater Basin Recharge Feasibility Study (MWH, 2004). The Bedford-Coldwater Model builds on earlier data from the 2004 MWH model, and expands the previous model in order to cover the rest of the Basin. This report documents the setup and calibration of the model, including the steps used to process to incorporate this data into the groundwater model.

2. BASIN GEOLOGY AND STRUCTURE

The following summarizes the hydrogeologic conceptual model (HCM) and groundwater conditions from the GSP (see Sections 3 and 4). The HCM and groundwater conditions create a foundation of the technical aspects of the Basin's hydrogeology necessary for model development. This section references figure and text in Sections 3 and 4 of the GSP.

2.1. BEDFORD COLDWATER BASIN

The Basin is a subbasin of the Elsinore Basin and covers approximately 11 square miles in western Riverside County (**Figure 1**). The Basin is located between the Santa Ana Mountains to the west and the Perris Plain on the east. The Basin is separated from the Temescal Subbasin to the northwest by a groundwater divide near Bedford Wash. A jurisdictional boundary separates the Basin with the Elsinore Valley Subbasin to the south. The Basin is thin in some areas, which impedes groundwater flow especially at the northern and southern boundaries.

2.1.1. Physiography

Ground surface elevations along the valley floor are generally flat. Elevations range from approximately 1,000 feet above mean sea level (msl) at the northern boundary to approximately 1,200 feet above msl to the south, as shown by 200-foot contours on **Figure 1**. The tributary watersheds reach up to more than 5,600 feet msl at the highest peak in the Santa Ana Mountain watersheds west of the Basin. Watersheds east of the Basin are significantly lower in elevation and rise only to about 1,800 feet.

Annual precipitation varies from below 12 inches to more than 26 inches over the Study Area. The long-term average annual rainfall is between 12 and 14 inches per year on the Basin floor and increases to more than 20 inches along the top of the local watersheds in the Santa Ana Mountains to the west.

2.1.2. Hydrology

The Basin covers a portion of the Santa Ana River watershed. Main tributaries to the Santa Ana River include Temescal Wash which flows through the Basin from the southeast to northwest and the Bedford Wash flowing toward the northeast along the northern boundary of the Basin. These waterways are ephemeral and are dry much of the year, flowing mainly during the winter. Water enters the basin as surface runoff and subsurface inflow from watersheds draining into the basin. The overall watershed tributary to the Basin was divided into 15 sub-watersheds for the purpose of simulating inflow to the model, as shown on **Figure 2**.

2.1.3. Management Areas

Two management areas have been designated for the Basin. These are:

- Bedford Management Area (Bedford MA) consists of the eastern areas of the Basin including Temescal Wash, and the Bedford area extends from the Elsinore Valley Subbasin to the south to the Temescal Subbasin to the north.
- Coldwater Management Area (Coldwater MA) consists of the western areas of the Basin and is more than 800 feet thick (Todd and AKM, 2008). The Coldwater Area does not share a boundary with either the Elsinore Valley or the Temescal Subbasins.

The Glen Ivy fault separates the Bedford area from the Coldwater area, resulting in differing geology, water use, water quality, and sources of water between the two areas. The fault offsets the aquifer units in the Bedford MA from the units in the Coldwater MA by up to approximately 250 feet (Todd, 2019), with the total basin thickness greater on the west side of the fault (Coldwater MA) relative to the east side of the fault (Bedford MA). These differences serve as the basis for defining two management areas in the Basin for the purpose of facilitating implementation of the GSP. The Bedford and Coldwater MAs will be used in the water budget analysis for the surface water and groundwater modeling results.

The Bedford MA is the area east of the Glen Ivy fault and west of the Estelle Mountain area. Alluvial sediments are up to 500 feet thick in the Bedford MA (Todd and AKM, 2008). Land uses are primarily urban residential and commercial/industrial in the Bedford MA. Temescal Wash flows from the southeast to northwest along the full length of the Bedford MA along the northern boundary of the Basin.

The Coldwater MA is the area located in a deep basin area located west the Glen Ivy fault and east of the Santa Ana Mountains. Alluvial sediments are more than 800 feet thick in the Coldwater MA (Todd and AKM, 2008). The City of Corona and Elsinore Valley Municipal Water District established a production agreement in 2008 to ensure the sustainable use of groundwater in the Coldwater area (EVMWD, 2008). Glen Ivy Hot Springs is a community water system with one well in the Coldwater MA, it is estimated the water system serves 750 people.

2.2. REGIONAL GEOLOGY

The Basin is located within one of the structural blocks of the Peninsular Ranges of Southern California. The Basin occurs in a linear low-lying block, referred to as the Elsinore-Temecula trough, between the Santa Ana Mountains on the west and the Perris Plain on the east (Norris and Webb 1990). The trough extends from Corona to the southeast some 30 miles and was formed along an extensive northwest-southeast trending fault zone including the Elsinore, Chino, and related faults. The Elsinore fault zone, including the Glen Ivy Fault, bound the Basin on the west and trend along the mountain front.

2.2.1. Geologic Units

The Bedford-Coldwater Basin is composed of alluvial fan, recent alluvial along Temescal Wash and older sedimentary rocks. These deposits are sourced from the Santa Ana Mountains to the west of the Basin and the Peninsular Ranges to the east of the Basin. Alluvial deposits along Temescal Wash and local tributaries define the eastern boundary of the Basin. The alluvial fan deposits in the Coldwater area extend into the Bedford area and appear to have been disrupted by faulting (GSP, Section 3, Figure 3-5).

Both older and recent alluvial fans have been deposited along the mountain front on the western edge of the Basin. Although these deposits are relatively thick, the entire unit is heterogeneous. These aquifers from less than 40 feet up to 500 feet in the Bedford area (eastern portion of the Basin) and up to 800 feet in thickness in the deepest portions of the Coldwater area (western portion of the Basin). Alluvial thicknesses tend to increase toward the center of the basin away from the faults (MWH, 2004, Todd and AKM 2008).

Underlying much of the Basin is the Bedford Canyon Formation (a slightly metamorphosed sedimentary formation composed of interlayered argillite, slate, graywacke, conglomeratic graywacke, impure quartzite, and small masses of limestone and quartz-rich metasandstone) and adjacent granitic rocks are the primary source materials for these alluvial deposits. In the northern Bedford area, a variety of

Tertiary sedimentary units crop out including the Silverado (Paleocene), Vaqueros (Miocene), Topanga (Miocene), and Puente (Miocene) formations (GSP, Section 3, Figure 3-5).

These uplands surrounding the Basin are composed principally of granitic, volcanic and older sedimentary rocks of Jurassic and Cretaceous age. The Coldwater MA is surrounded by the metamorphic, volcanic and granitic basement rocks of the Santa Ana Mountains to the south and west. Around the Bedford MA is an area of sedimentary units of Tertiary age that crop out along the mountain front generally lying east of the Glen Ivy Fault within the Elsinore Fault Zone. This zone of sedimentary units broadens to the north and contains numerous mapped formations of Cretaceous and Tertiary age.

2.2.2. Faults

The Glen Ivy Fault is associated with the right lateral strike-slip-dominated Elsinore Fault Zone that extends approximately 200 km from Baja California north to the Corona area. Bedrock faulting in the area largely controls depth to bedrock and the resultant alluvial thickness (MWH, 2004). The units in the Basin are truncated by the Glen Ivy fault that separates the Bedford area from the Coldwater area.

The location and effect of the Glen Ivy fault on the units of the Basin are shown on cross sections presented in GSP Section 3 (Figures 3-6 through 3-8). As shown on these cross sections, the Glen Ivy fault and related faults offset the units approximately by as much as 250 feet. This offset is inferred from well logs that extend to bedrock near the fault. Groundwater flow in the Basin is strongly affected by the Glen Ivy fault (Todd and AKM 2008, WEI 2015b) and the fault appears to be a nearly complete barrier to subsurface flow (MWH, 2004)

2.2.3. Pull-Apart Basin

The Elsinore Fault Zone forms a complex series of pull-apart basins (Morton and Weber 2003). The deep portion of the Basin in the Coldwater MA is one of these pull-apart basins. Pull-apart basins are topographic depressions that form at releasing bends or steps in basement strike-slip fault systems. This initial deposition into the Basin is composed of rapid deposition of landslide and debris flow deposits which are extremely poorly sorted with a mixture of clay, sand, gravel and boulders as seen on the well logs at the lower depths. Since the movement on the faults is right-lateral, the oldest sediments will be located at the lower levels in the northern part of the Basin. As the pull-apart basin forms, progressively younger sediments will be deposited from north to south. Because of this type of deposition, the lower units of the pull-apart basin can be chaotic.

Pull-apart basins are topographic depressions that form at releasing bends or steps in basement strike-slip fault systems. Traditional plan view models of pull-apart basins usually show a rhombic to spindle-shaped depression developed between two parallel master vertical strike-slip fault segments. The basin is bounded longitudinally by a transverse system of oblique-extensional faults, termed “basin sidewall faults” (**Figure 3**). Basins commonly display a length to width ratio of 3:1 (Wu et.al., 2012).

The Coldwater area of the Basin is located within a pull-apart basin between the Glen Ivy fault and the Elsinore Fault Zone located at the base of the Santa Ana Mountains. Based on the geology, the Glen Ivy fault limits deep groundwater flow, resulting in a limitation of the hydraulic connection between the Coldwater ad Bedford areas. At depth, the offset geologic units place the alluvial deposits in the Coldwater area against the Tertiary Bedford Canyon Formation. When groundwater levels in the Coldwater area are low, there is reduced groundwater flow across the fault. This is especially apparent during the recent periods when the groundwater levels in the Coldwater area were especially low. During these low water periods in the Coldwater area, groundwater levels are higher across the fault in the Bedford area resulting in minor inflows from Bedford into the Coldwater area. This is shown in some recent groundwater level data (GSP Sections 3 and 4). However, at shallower depths, the fault offset is across alluvial deposits. During periods, or areas, when groundwater levels in the Coldwater area are high, groundwater elevation data suggests these areas appear to be well-connected when groundwater elevations in the Basin are high (MWH, 2004, Todd and AKM 2008), indicating more compartmentalization with depth.

2.2.4. Definable Basin Bottom

The Basin bottom is defined by bedrock, which is shallow around the perimeter and deep in the center. Depth to bedrock ranges in depth from 10 feet to over 700 feet (Todd and AKM, 2008 and WEI, 2015b). The depth to the bottom of the alluvial materials in the Basin and the contact with the bedrock bottom of the Basin are shown in the contours presented in GSP, Section 3 (Figures 3-9). Aquifer thickness is greatest in the Coldwater portion of the Basin west of the Glen Ivy fault. Additional cross sections showing these relationships are provided in the GSP, Section 3 (Figures 3-6 through 3-8).

2.3. GROUNDWATER CONDITIONS

Understanding the groundwater conditions is important in development of the surface water and groundwater models. A summary of the discussion of the groundwater conditions and water balance based on the model results is provided in GSP Sections 4 and 5 is provided below.

2.3.1. Aquifer

The Basin is defined by the lateral extents of the alluvial material described above. This material is bounded by bedrock in the Santa Ana Mountain on the west and the Peninsular Ranges to the east. The southern and northern boundaries of the Basin are formed by areas of thin alluvial material over shallow bedrock in narrow valleys (Todd and AKM, 2008 and WEI, 2015b). The northeastern side of the valley is flanked primarily by granitic rocks of Cretaceous age. Erosion of these units has filled in the trough over time resulting in quaternary-age alluvial fan, channel, and other deposits making up the permeable portions of the groundwater Basin (Todd and AKM, 2008). The Basin is thin in some areas, which impedes groundwater flow. This is especially relevant at the northern and southern boundaries of the Basin. With the exception of the Glen Ivy fault described above, there are no other known aquifer characteristics impeding or impacting flow in the Basin.

The Basin aquifer is truncated by the Glen Ivy Fault that separates the Bedford area from the Coldwater area. The location and effect of the Glen Ivy Fault on the units of the Basin are shown on cross sections in GSP, Section 3 (Figures 3-6 through 3-8). As shown on these cross sections, the Glen Ivy Fault offsets the units by up to 250 feet. As noted above, these faults may sometimes impede groundwater flow, backing up groundwater west of the fault within the Coldwater MA and limiting flow into the Bedford MA (Todd 2019). However, there is insufficient groundwater elevation monitoring information to assess the extent of this potential barrier to flow and it is therefore not considered a complete barrier to groundwater flow in the Basin.

2.3.2. Recharge and Discharge Areas

Recharge to the Basin occurs primarily from infiltration of runoff, and to a lesser extent from deep percolation of precipitation and urban return flows, wastewater recharge, and subsurface inflow from outside the Basin. Most of the Basin recharge comes from the infiltration of runoff from precipitation in the Santa Ana Mountains west of the Basin and the Peninsular Ranges east of the Basin. Large amounts of runoff from the mountains flows into unlined channels and the shallow subsurface at the edges of the Basin and then on into and through the Basin. The amount of water available for recharge varies annually with changes in rainfall and runoff. Runoff into the Basin is subject to evapotranspiration, infiltration, and continued surface flow to and in the Temescal Wash. The watersheds contributing to the Basin include multiple drainages, all of which flow across the Basin in generally east-west orientations. Wet years generate large amounts of water that exceeds the recharge capacity of the Basin (Todd and AKM 2008).

Return flows are those portions of applied water (e.g., landscape irrigation) that are not consumed by evapotranspiration and returned to the groundwater system through deep percolation or infiltration. Return flows associated with urban, industrial, and agricultural water uses all have the potential to contribute to recharge to the Basin (Todd and AKM 2008). Discharge from wastewater treatment and subsurface inflow occur to a limited extent in the Basin. Recharge associated with wastewater is associated with discharge at the wastewater treatment facilities. Subsurface inflow occurs along the Basin boundaries. This is not considered to be a significant source of recharge to the Basin (Todd and AKM 2008).

Sand and gravel mining has been the predominant industrial land use in the southern half of the Coldwater MA, an activity that continues today. Localized sand and gravel operations are also located along Temescal Wash in the Bedford MA. In addition, berms along washes, diversions of surface water, and the presence of large gravel pits enhance groundwater recharge of runoff in Coldwater area (Todd and AKM, 2008).

Discharge from the Basin is almost entirely from groundwater pumping, evapotranspiration, and mining operations. There is some limited discharge across the northern Basin boundary with the Temescal Subbasin, but the thin alluvial material in this area limits the volume and timing of subsurface outflow along this boundary (Todd and AKM, 2008).

2.3.3. Primary Groundwater Uses

The primary groundwater uses in the Basin are municipal pumping, with limited private pumping for small water system, commercial, industrial and residential users. Groundwater use estimates are included in GSP Section 5 (Water Budget). Groundwater in the principal aquifer in the Bedford area is primarily used for non-potable municipal and irrigation water supply. The principal aquifer in the Coldwater area is mostly used for municipal water supply. Most of the pumping in this area is from wells owned and operated by the BCGSA agencies, with some additional pumping by small community water system and small commercial users. There has historically also been non-potable pumping in this area to support agricultural, recreational, small residential, and industrial water uses.

Gravel operations in the Coldwater MA extract water for industrial use to support sand and gravel mining. Their pumping amounts have ranged from about 100 AFY to 300 AFY, except for a period of increased production from 1975 through 1980 when production averaged about 450 AFY (Todd and AKM 2008).

3. RAINFALL-RUNOFF-RECHARGE MODEL

A rainfall-runoff-recharge model developed by Todd Groundwater was used to prepare estimates of groundwater recharge from rainfall, irrigation, bedrock inflow, and pipe leaks. It also generated the estimates of groundwater use for agricultural irrigation and flows in ungauged streams tributary to or within the basin. Several commercially available software programs were used to prepare model input and evaluate model output, such as Microsoft Excel and ArcGIS. Finally, the rainfall-runoff-recharge model and several pre-processing utility programs were developed in the Fortran 90 programming language by Todd Groundwater.

3.1. APPROACH

The rainfall-runoff-recharge model is built around a soil moisture balance of the root zone, which is simulated continuously using daily time steps for the 29-year calibration period. Numerous variables are involved in the physical processes of rainfall, interception, runoff, infiltration, root zone soil moisture storage, evapotranspiration, irrigation, shallow groundwater storage, recharge of deeper regional aquifers from shallow groundwater, and lateral flow of shallow groundwater into streams. Accordingly, the groundwater basin and tributary watersheds were divided into small recharge zones over which the most influential variables were relatively homogeneous. The daily water balance was then simulated for each zone, and the results aggregated geographically to cells in the groundwater model grid and temporally to the model stress periods.

The rainfall-runoff-recharge model provides several benefits to the groundwater modeling effort:

- It represents the hydrological processes with governing equations that reflect the actual physical processes, at least in a simplified way. This allows sensitivity or suspected errors to be traced to specific assumptions and processes.
- It enforces the principle of conservation of mass on the recharge and stream flow values. Beginning with rainfall, all water mass is accounted for as it moves through the hydrological system.
- It allows additional data sets to be included in model calibration. In tributary watersheds with gauged stream flow data, measured flows can be compared with simulated flows, which consist of the sum of direct runoff and shallow-groundwater seepage to streams. Simulated irrigation frequency can be compared with actual grower practices, and applied irrigation amounts can be compared with water delivery data recorded by the District. Simulated urban irrigation amounts can be compared with seasonal variations in measured urban water use, which are primarily related to urban irrigation.
- It provides estimates of stream flow in ungauged tributary streams, as well as runoff from valley floor areas within the active model domain.
- It provides estimates of inflow from bedrock and/or upland areas adjacent to the active model domain and constrains the amounts of inflow according to the water balance for each tributary watershed.
- It simulates the effects of runoff from impervious surfaces in urban areas, either to storm drainage systems or to adjacent pervious soils.
- It simulates changes in land use over the 29-year calibration period and the resulting changes in recharge and irrigation demand.

- It combines and parses all of these flows—plus estimated recharge from leaky water and sewer pipes—into recharge values by model cell and stress period in the format required by MODFLOW.

The following sections describe the input data sets and the assumptions and governing equations used to simulate each hydrologic process included in the rainfall-runoff-recharge model.

3.2. LAND USE AND RECHARGE ZONES

Recharge zones were developed by intersecting and editing numerous maps in GIS. The starting point was a map of the Bedford-Coldwater Basin and the boundaries of all surrounding watersheds that flow into it. The Basin area was divided into the Bedford MA and Coldwater MA. The Basin and tributary watersheds were then divided into numerous polygons reflecting land use as of 1990 and changes in land use since then. Land use was delineated into 13 categories based on DWR land use maps for Riverside County from 1993 and 2000, a statewide crop map developed by LandIQ for DWR in 2014 and Google Earth historical aerial imagery available for 1990-2018. The primary change in land use has been urbanization of undeveloped (natural vegetation) areas. Polygons were delineated to represent the locations of changes in land use so that a single, fixed set of polygons could accurately represent the evolution of land use by changing the use type of a polygon beginning in the year that land use changed. Additional divisions of polygons were made on the basis of soil texture, annual rainfall and watershed. This resulted in a total of 224 polygons ranging in size from 2 to 4,529 acres. A map of the zones and their land uses in 1990 and 2018 is shown in **Figure 4.**

Land use in each zone was assigned to one of thirteen categories. The only agricultural crop in the Basin is citrus, which occupied about 1,900 acres in 1990 and was almost entirely converted to residential during the 1990s. Natural land cover categories are grassland, shrubs/trees, dense riparian, sparse riparian and open water. Developed land uses are residential, low-density residential, turf, commercial, industrial, quarry and vacant. The natural and developed land uses were mapped by inspection of Google Earth aerial photography. The categories are listed in **Table 1** along with their total acreages in 1990, 2018 and 2068 (estimated) in the groundwater basin management areas and tributary watersheds.

Table 1. Bedford-Coldwater Basin Land Use (acres)

	Bedford Area			Coldwater Area			Tributary Watersheds		
Land Use	**1990**	**2018**	**2068**	**1990**	**2018**	**2068**	**1990**	**2018**	**2068**
Citrus	1,242	0	0	677	32	32	0	0	0
Grassland	1,700	1,454	385	171	87	33	16,703	16,429	16,174
Shrubs/Trees	226	110	30	173	138	82	13,777	13,693	13,693
Dense riparian	217	120	120	8	27	27	0	0	0
Sparse riparian	291	291	291	0	0	0	0	0	0
Open water	0	0	0	0	0	0	0	0	0
Low-density residential	159	175	132	66	88	88	0	0	0
Residential	179	1,023	2,255	76	405	547	0	94	327
Turf	7	225	288	0	170	226	0	85	107
Commercial	0	30	528	24	33	50	0	0	0
Industrial	232	469	469	0	0	0	0	0	0
Quarry	295	204	104	441	588	0	365	555	555
Vacant	648	1,030	494	38	105	0	0	0	0

Each land use category is further divided into irrigated, non-irrigated and impervious subareas. These are not explicitly mapped but are expressed as percentages of total zone area. Based on examination of aerial photographs and historical water use patterns, the percent impervious cover in urban land use areas was estimated to be 15 percent for low-density residential, 45 percent for residential, 70 percent for commercial and 80 percent for industrial. The corresponding percent irrigated area for those categories was estimated to be 14, 18, 10 and 0 percent, respectively.

3.3. RAINFALL

The distribution of average annual rainfall over the basin and tributary watersheds was obtained from PRISM climate modeling (http://www.prism.oregonstate.edu/). Each recharge zone was assigned an average annual rainfall value based on its location, as shown in **Figure 5**.

The surface hydrology model requires daily rainfall as one of two transient inputs. Daily rainfall for the Elsinore station was used for this purpose, with missing values supplied by correlation with rainfall at the Riverside Fire Station and Claremont-Pomona Stations, both of which also have long periods of record. Daily rainfall for each recharge zone was calculated as Elsinore daily rainfall multiplied by the ratio of zonal average-annual rainfall to Elsinore average-annual rainfall.

3.4. INTERCEPTION

Plant leaves intercept some of the rain that falls from the sky, and the amount is roughly proportional to the total leaf area of the vegetation canopy. The estimated interception on each day of rain ranged from zero for industrial, idle and vacant land uses, to 0.03 inch for turf and 0.06 inch for trees in full leaf. These estimates were inferred from published results of interception studies (Viessman and others, 1977). For each day of the simulation, rainfall reaching the land surface (throughfall) is calculated as rainfall minus interception. Interception storage is assumed to completely evaporate each day and is not carried over from one day to the next.

3.5. RUNOFF AND INFILTRATION

Most throughfall infiltrates into the soil, but direct runoff occurs when net rainfall exceeds a certain threshold. The threshold at which runoff commences and the percent of additional rainfall that runs off are significantly influenced by a number of variables, including soil texture, soil compaction, leaf litter, ground slope, and antecedent moisture. These factors can be highly variable within a recharge zone, and data are not normally available for them. Also, the intercept and slope of the rainfall-runoff relationship depend on the time increment of analysis. Most analytical equations for infiltration and runoff apply to spatial scales of a few square meters over periods of minutes to hours (Viessman and others, 1977). They are suitable for detailed analysis of individual storm events. The curve number approach to estimating runoff also applies to single, large storm events. It is not suitable for continuous simulation of runoff over the complete range of rainfall intensities (Van Mullen and others, 2002). The approach used in the rainfall-runoff-recharge model is similar but less complex than the approach used in popular watershed models such as HSPF (Bicknell and others, 1997).

In the rainfall-runoff-recharge model, daily infiltration is simulated as a three-segment linear function of throughfall, and throughfall in excess of infiltration is assumed to become runoff. The general shape of the relationship of daily infiltration to daily net rainfall is shown in **Figure 6** (upper graph). Below a specified runoff threshold, all daily throughfall is assumed to infiltrate. Above that amount, a fixed percentage of throughfall is assumed to infiltrate, which is the slope of the second segment of the infiltration function. Finally, an upper limit is imposed that represents the maximum infiltration capacity of the soil. The runoff threshold, the percentage of excess net rainfall that infiltrates, and the maximum daily infiltration capacity were assumed to vary by land use and were among the variables adjusted for model calibration. The runoff threshold ranged from 0.2 inches per day (in/d) for unpaved areas in industrial and commercial zones to 1.0 in/d for turf and natural vegetation areas. The infiltration percentage for excess rainfall ranged from 60 percent in commercial and industrial areas to 94 percent in areas of natural vegetation. The maximum daily infiltration was set to 2.5 in/d in upland tributary areas and 4 in/d for zones overlying the Basin. These values were selected on the basis of calibration, although results were not very sensitive to this parameter.

The above parameter values are for soils that are relatively dry. Infiltration rates decrease as soils become more saturated. This phenomenon led to the development of the Antecedent Runoff Condition adjustment factor for rainfall-runoff equations (Rawls and others, 1993). However, application of the concept has been focused on individual storm events. For the purpose of the rainfall-runoff-recharge model, the adjustment provides a means of simulating empirical observations that a given amount of rainfall produces less runoff at the beginning of the rainy season when soils are relatively dry than at the end of the rainy season when soils are relatively wet. This effect is included in the recharge model as a multiplier that decreases the estimated infiltration as soil saturation increases. This multiplier is applied to the runoff threshold, the infiltration slope and the maximum infiltration rate. The multiplier decreases from 1.0 when the soil is dry to a user-selected value between 1.0 and 0.60 when the soil is fully saturated (lower graph in **Figure 6**). A low value has the effect of decreasing infiltration (and potential groundwater recharge) toward the end of the rainy season or in very wet years, and also to increase simulated peak runoff during large storm events. The multiplier under saturated conditions was assumed to be 0.75 for the Bedford-Coldwater rainfall-runoff-recharge model.

Runoff from impervious surfaces was assumed to equal 100 percent of rainfall. Runoff that flows into a storm drain system (known as “connected impervious runoff”) contributes to stream flow but not groundwater recharge. However, runoff from some impervious surfaces flows onto adjacent areas of pervious soils (“disconnected impervious runoff”). The surface hydrology model treats this type of runoff as if it were a large increment of additional rainfall where it flows over or ponds on the pervious soils. The excess water can quickly saturate the soil and initiate deep percolation. The model incorporates this process by means of a variable representing the fraction of impervious runoff that becomes deep percolation. Data and literature values are not available for this variable. It was estimated to be 20 percent in residential, commercial and industrial areas and 80 percent in low-density residential areas.

3.6. ROOT ZONE DEPTH AND MOISTURE CONTENT

The storage capacity of the root zone equals the product of the vegetation root depth and the available water capacity of the soil. The available water capacity for each recharge zone was a depth-weighted average for the dominant soil type, as reported in the soil survey (Natural Resources Conservation Service, 2015). Root depth is a complex variable. Except for cropland, vegetation cover typically consists of a mix of species with different root depths. At a very local scale, roots are deepest directly beneath a plant and shallower between plants. Root density and water extraction also typically decrease with depth within the root zone. To complicate matters, root depth is somewhat facultative for some plants, which means that roots will tend to grow deeper in soils with low available water capacity, such as sands. Finally, root depth in upland watershed areas can be restricted by shallow bedrock.

The root depth selected for each recharge zone essentially represents an average of all these factors. Simulated recharge and stream base flow are both quite sensitive to vegetation root depth, and values were adjusted during the joint calibration of the rainfall-runoff-recharge model and the groundwater flow model. Separate root depths were specified for irrigated and non-irrigated vegetation in each recharge zone. Root depths for turf and crops were required to be the same in all zones. In upland watersheds root depth can be affected by the depth to bedrock, which is often shallow. Outflow from individual tributaries flowing into the basin is not gaged, and uniform rooting depths for grass and shrubs/trees were used throughout all of the watersheds.

3.7. EVAPOTRANSPIRATION

Evapotranspiration is affected by meteorologic conditions, plant type, plant maturity, and soil moisture availability. All of these factors are included in the rainfall-runoff-recharge model. The evaporative demand created by meteorological conditions is represented by reference evapotranspiration (ETo). Numerous equations have been developed over the years relating ETo to solar radiation, air temperature, relative humidity and wind speed. For the purposes of this study, daily values of ETo were obtained from a microclimate station in Temecula (about 20 miles south of the Basin) that is part of the California Irrigation Management Information System (CIMIS) network.

Vegetation factors are lumped into multipliers called crop coefficients. Reference ET is the amount of water evapotranspired from a broad expanse of turf mowed to a height of 4-6 inches with ample irrigation. ETo is multiplied by a crop coefficient to obtain the actual ET of a different crop or vegetation type at a particular stage in its growth and development. Although primarily used for agricultural crops, crop coefficients can also be applied to urban landscape plants and natural vegetation. The only agricultural crop in the Basin is citrus trees, which have a crop coefficient that ranges from 0.5 in winter to 0.91 in mid-summer (U.N. Food and Agriculture Organization, 2006). Irrigated landscaping was assumed to consist primarily of turf, for which a crop coefficient of 0.8 was used in all months (Snyder and others, 2007). Non-irrigated natural grassland consists of annual grasses that go dormant in summer once soil moisture has been depleted. A crop coefficient of 1.0 was assigned in all months, but actual ET decreases to zero as the grasses lower soil moisture to the wilting point in summer. Natural shrubs/trees were assigned a crop coefficient of 0.8 year-round. Those perennial species have deeper roots and do not tend to fully deplete root zone soil moisture during a single dry season (Blaney and others, 1963). Many riparian phreatophytes are deciduous, and a crop coefficient of 0.75 was assigned for winter months to reflect a reduced leaf area index. Their tall stature and linear distribution within an arid landscape raises the crop coefficient in summer months, and a coefficient of 1.10 was assigned to reflect those factors.

3.8. IRRIGATION

Evapotranspiration gradually depletes soil moisture, and for irrigated areas the rainfall-runoff-recharge model triggers an irrigation event whenever soil moisture falls below a specified threshold. The amount of applied irrigation water is equal to the volume required to refill soil moisture storage to field capacity, divided by the assumed irrigation efficiency. An irrigation threshold equal to 70 percent of maximum soil moisture storage was used for citrus, and a threshold of 0.8 was used for urban landscaping. This variable primarily affects the frequency of irrigation; a higher threshold results in more frequent irrigation but approximately the same total amount of water applied annually. Ten percent of water applied to citrus was assumed to percolate past the root zone, and 15 percent was assumed for urban irrigation. This reflects nonuniformity of applied water, such as uneven overlap of sprinkler spray areas.

There are additional sources of irrigation inefficiency, such as evaporation of sprinkler spray mist and sprinkler overspray or runoff onto impervious surfaces in urban areas. Thus, total irrigation efficiency is less than 90 percent for citrus and 85 percent for urban landscaping. Total efficiency was used to estimate applied water, but only the deep percolation component was used to estimate deep percolation. Urban irrigation in the Basin is supplied by municipal water purveyors, and irrigation use is included in their metered deliveries. The rainfall-runoff-recharge model was only used to estimate groundwater pumping for citrus irrigation.

Because irrigation is assumed to completely refill soil moisture storage and is less than 100 percent efficient, simulated soil moisture exceeds capacity immediately following an irrigation event. The excess is assumed to become deep percolation beneath the root zone.

3.9. DEEP PERCOLATION FROM ROOT ZONE TO SHALLOW GROUNDWATER

The surface hydrology model updates soil moisture storage each day to reflect inflows and outflows. Rainfall infiltration and applied irrigation water are added to the ending storage of the previous day, and ET is subtracted. If the resulting soil moisture storage exceeds the root zone storage capacity, all of the excess is assumed to percolate down from the root zone to shallow groundwater on that day. In modeling parlance, this is known as a “bathtub model”; vertical unsaturated flow and preferential flow through cracks and root tubes in the soil are not considered.

3.10. MOVEMENT OF SHALLOW GROUNDWATER TO DEEP RECHARGE AND STREAM BASE FLOW

A shallow groundwater storage component may not be part of all groundwater systems, but its presence is sometimes indicated by groundwater hydrographs and stream base flow. In upland watersheds, for example, the shallow groundwater reservoir is what supplies base flow to streams. Without it, simulated stream flow consists of large flows occurring only on rainy days. Physically, it represents the overall permeability and storage capacity of deep soil horizons and bedrock fractures beneath hillsides bordering a gaining stream. It allows the integration of shallow and deep, fast and slow flow paths between the point of rainfall infiltration and the stream. In valley floor areas with flat terrain and deep deposits of unconsolidated basin fill, the presence of a shallow groundwater system is sometimes evident in a lack of response of deep well hydrographs to rainfall recharge events or even wet versus dry years. The shallow zone in that case attenuates the pulses of recharge percolating beneath the root zone into a relatively steady recharge flux, and there may be little outflow to streams.

In the surface hydrology model, the only inflow to shallow groundwater storage is deep percolation from the root zone. There are two outflows: laterally to a nearby creek and downward to the regional groundwater flow system. Outflow to streams is specified as a certain percentage of current groundwater storage, which results in a first-order logarithmic recession of stream base flow, consistent with gaged stream flows. Outflow to the regional groundwater system is simulated as a constant downward flux. This is consistent with flow across confining layers in which the vertical head gradient is near unity. Both outflows are calculated and subtracted from shallow groundwater storage each day. They continue until the storage has been exhausted, resuming whenever a new influx of deep percolation from the root zone arrives. There is no assumed maximum capacity of shallow groundwater storage.

The two parameters defining shallow groundwater flow are the recession constant for flow to streams and the constant downward flow rate for deep recharge. Both of these are obtained by calibration. The recession constant can generally be calibrated by matching simulated to measured stream base flow in gaged watersheds. The deep recharge rate can be used to adjust the long-term partitioning of shallow groundwater mass into base flow versus recharge.

The shallow groundwater component of the surface hydrology model is simple but adequate to capture the fundamental behaviors of logarithmic stream base flow recession and attenuated deep recharge. Other watershed models invoke more complex systems of storage and flow to simulate these processes. For example, the Precipitation and Runoff Modeling System (PRMS) developed by the U.S. Geological Survey includes a total of seven storage components between the point where a raindrop reaches the ground and the stream into which it ultimately flows (Markstrom and others, 2015). This larger number of components and parameters enables relatively detailed matching of observed stream flow hydrographs but is unnecessarily complex for the purposes of groundwater modeling.

3.11. EVAPOTRANSPIRATION BY RIPARIAN VEGETATION

In locations where the water table is shallow, some plants (phreatophytes) can extract water directly from the water table to meet evaporative demand. The rainfall-runoff-recharge model was used to estimate the amount that would be drawn from the water table if a shallow water table were present. The potential use of groundwater by phreatophytes was assumed to equal the ET demand of the vegetation minus the amount that could be supplied by soil moisture. In practice, this was accomplished by temporarily simulating the vegetation as if it were irrigated using the rainfall-runoff-recharge model, then using the simulated irrigation rates as the maximum rate of withdrawal by roots from the water table. This rate of groundwater use is thought to decrease with increasing depth to the water table because fewer shrub and tree roots are able to reach the water table and the energetics of withdrawing the water become less favorable. The use of groundwater decreases from the maximum rate when the water table is at the land surface to zero when the water table is 15 feet or more below the ground surface. These calculations are applied at model cells where aerial photographs indicate the presence of dense, lush riparian vegetation, which is a sign of phreatophytic water use. These calculations were also made using the MODFLOW evapotranspiration (EVT) module.

3.12. GROUNDWATER INFLOW

Groundwater inflow into the basin from adjacent uplands—also called mountain front recharge—is difficult to estimate. If the basin is bounded by igneous or metamorphic rocks with very limited groundwater flow through fractures, it can be reasonable to assume that inflow from bedrock is negligibly small. If the bedrock is fractured, the total amount of inflow across the long "no-flow" boundaries on the east and west sides of the Basin can be cumulatively significant. Subsurface inflow across those boundaries was estimated using the rainfall-runoff-model results for the tributary watersheds. By this method, the estimates must be consistent with conservation of mass in the watersheds; that is, with the estimates of rainfall, ET, and surface outflow. The resulting estimates are still highly uncertain, however, because groundwater outflow from the watersheds—and surface outflow, too, for that matter—are both small compared to the two largest flows in the watershed water balances: rainfall and evapotranspiration. Thus, a small error in the estimate of either of those flows can result in a large error in groundwater outflow.

Ultimately, groundwater flows produced by the rainfall-runoff-recharge model were calibrated based on their effects on simulated groundwater levels at nearby wells within the basin and on the simulated amount of stream base flow exiting the watersheds. The initial groundwater inflow estimates were generally too high. The estimates were lowered primarily by increasing the estimated root depth of natural vegetation in the watersheds, which is highly uncertain due to the effects of shallow bedrock on rooting depth.

Groundwater inflow from tributary watersheds was smoothed over time to reflect attenuation of recharge pulses that occur during wet months and wet years as they gradually flow through long, relatively slow flow pathways. Smoothing was accomplished by a moving average of simulated groundwater recharge in the tributary areas over the preceding 2-10 years. This range represents local variability that was indicated by rates of recession in stream base flow and groundwater levels near the basin boundary during prolonged droughts. The final estimate of average annual groundwater inflow during the calibration period was 5,400-7,200 AFY under normal climatic conditions.

3.13. CALIBRATION OF RAINFALL-RUNOFF-RECHARGE MODEL

Parameters in the rainfall-runoff-recharge model were jointly calibrated with the groundwater model. The total amount of dispersed recharge and annual variations in recharge influence simulated groundwater levels, and parameters in the rainfall-runoff-recharge model were adjusted to improve the fit between measured and simulated groundwater hydrographs. The rainfall-runoff-recharge model was also calibrated based on a comparison of measured and simulated daily stream flow at two gage locations: Coldwater Canyon Creek and Temescal Wash at the Lee Lake dam. Coldwater Canyon Creek flows into the adjacent Bedford-Coldwater Basin and is the only gaged stream draining the eastern slopes of the Santa Ana Mountains. Characteristics and model parameters for that watershed were assumed to also apply to similar watersheds along the western edge of the Basin. Unfortunately, the gage began operation in 2019, which is after the 1990-2018 model simulation period. Nevertheless, the general pattern of flow peaks and base flow recession simulated in prior years was similar to the gaged pattern in 2019-2020, as shown in **Figure 7**.

4. NUMERICAL GROUNDWATER MODEL DEVELOPMENT

The numerical model incorporated the hydrogeological data from the basin and hydrologic model and is capable of simulating historical and future conditions. The following section describes the development of each of the components in the MODFLOW model.

4.1. GENERAL APPROACH

The Bedford-Coldwater Model is a numerical groundwater model, which is a mathematical description of the hydrogeological conceptual model (Bear and Verruijt, 1987). The advantage of a numerical model is that, once in a mathematical format, the model quantitatively combines data on basin geometry, aquifer properties, recharge, and discharge to simulate changes in groundwater elevations and calculate the water balance over time.

The Bedford-Coldwater Model is setup to represent the physical features that influence groundwater flow including the geology, hydrology and climate. Each of these features is mapped onto a model grid that represents the vertical and horizontal distribution of parameters over the Basin based on the hydrogeological conceptual model. The parameters can also be varied through time over a defined base period to represent seasonal variations in precipitation, streamflow and groundwater pumping. A more detailed discussion of how each of these parameters was developed and entered into the Bedford-Coldwater Model is summarized below.

- Model Setup - representation of the physical groundwater basin
- Boundary Conditions – representation of the inflows and outflows from outside of the model
- Aquifer Properties – representation of the flow characteristics of the aquifer
- Initial Conditions – representation of groundwater conditions prior to the model period

The model development was focused on the HCM with emphasis on defining boundary conditions and flow paths. Aquifer parameters were assigned on a subregional basis within each MA and varied by model layer to represent reasonable aquifer properties for the geologic unit being simulated.

4.2. MODEL SETUP

The model also incorporates spatial distribution of the physical features of the Basin and the temporal distribution of time-varying parameters such as precipitation and recharge. The following describes the basic components required to construct a numerical model.

4.2.1. Model Code Selection

The model setup utilizes the MODFLOW modeling code developed by the United States Geological Survey (USGS). The Bedford-Coldwater Model uses MODFLOW-NWT (Niswonger *et al*, 2011), which is a standalone version of MODFLOW-2005 (Harbaugh, 2005) that includes an advanced mathematical solver that provides a more robust solution to complex conditions such as rewetting of dry model cells, unconfined conditions and groundwater-surface water interactions. These features improve the ability of the Model to evaluate complex groundwater-surface water interactions, potential conjunctive use, and other projects to increase future groundwater levels in the Basin.

4.2.2. Base Period

The update Bedford-Coldwater Model is setup using water years that run from October through to the following September to capture the cause and effect relationship on groundwater levels of wintertime rain and subsequent summertime groundwater pumping. The model simulates the 29-year base period from October 1989 through September 2018 to represent Water Years (WY) 1990 through 2018. This retains the starting date of prior models, which coincides with the beginning of some key data sets and also the beginning of the period of rapid land use conversion from agricultural to urban. The ending year is the most recent year for which all necessary model input data were available. The 29-year simulation period is desirable for model calibration purposes because it includes a wide range of hydrologic and water use conditions, including wet periods, droughts, changes in groundwater pumping and implementation of lake management measures.

To simulate this base period, the model is subdivided into time intervals termed stress periods. For each water year, monthly stress periods were defined to provide the ability of the model to evaluate temporal at a monthly scale. For the base period, a total of 348 stress periods were defined. Time-dependent parameters, such as groundwater pumping or precipitation recharge, are assigned to for each stress period.

Conditions during the stress period are constant, but parameters can be varied from stress period to stress period. A stress period can be subdivided into shorter time periods, or timesteps, to allow for more temporal resolution within each stress period to help with model convergence. For the Bedford-Coldwater Model, each stress period was simulated using three (3) timesteps. MODFLOW calculates the groundwater elevations and water balance for each time step. The model results provide the groundwater elevations for the final timestep of each stress period, and the summation of the water balance changes for all timesteps for each stress period.

4.2.3. Model Domain and Grid

MODFLOW requires the application of a rectangular grid that encompasses the entire area, or domain, that will be modeled. The model grid forms the mathematical framework for the model. Each grid cell has to be populated with aquifer properties. Physical features such as streams and wells are mapped onto the model grid. Using this information, the MODFLOW model calculates a groundwater elevation at each model grid cell for each timestep. The density of model grid cells is what defines the resolution of the model in resolving drawdown and other hydrologic effects.

The Basin covers about 11 square miles of the Santa Ana River Watershed that underlies the Elsinore Valley in western Riverside County. The extent of the model domain for the Bedford-Coldwater Model is shown on **Figure 8**. The Basin has two management areas that are defined within the model domain for water budget zone budgets (**Figure 9**). These include:

- **Bedford Management Area (Bedford MA)** occupies roughly the eastern two-thirds of the Basin. It is separated from the Coldwater MA by the Glen Ivy Fault, which is a partial barrier to groundwater flow. The Bedford MA connects to the Elsinore Subbasin in the south and the Temescal Basin at the north end of the Basin.,
- **Coldwater Management Area (Coldwater MA)** is the part of the Basin west of the Glen Ivy Fault. Because of downward movement on that side of the fault, Basin thickness is much greater than in the Bedford MA. A large open-pit mine is located in the southern part of this MA. Several streams enter the Coldwater MA from watersheds on the eastern slopes of the Santa Ana Mountains.

The Bedford-Coldwater Model consists of 250 rows, 365 columns and 3 layers. The rows and columns have a uniform spacing of 100 feet. Each 100-foot square represents a model cell. MODFLOW calculates one groundwater level for the center point of each grid cell for each timestep. The total number of grid cells in the Bedford-Coldwater Model is 273,750 cells, of which 87,882 are active cells where MODFLOW calculates a groundwater levels. The active areas represent the area within the groundwater basin where groundwater elevations are simulated.

Areas outside of the Basin are represented as no-flow cells where MODFLOW does not perform calculations. The high percentage of no-flow cells in the model grid is due to both the elongate shape of the Basin, the inclusion of narrow watersheds off of the main Basin, and because the distribution of active cells varies from layer to layer. The bottom of the lowest model layer is a no-flow boundary condition, representing the older bedrock formations that are assumed to be relatively impermeable.

4.2.4. Model Layers

The model layers represent the geologic the geologic units that compose the Principal Aquifer of the Basin based on the geology and HCM presented in summarized in **Section 2**. Model layers provide vertical resolution for the model to simulate variations in groundwater elevation, aquifer stresses, and water quality with depth. The model layers are based on an evaluation of the following data sets:

- Surficial geology,
- Faulting,
- Lithologic borehole logs.
- Well construction logs, and
- Previously completed local hydrogeologic conceptualizations and cross sections.

This information was collected and translated into a unified GIS compatible database structure for cross section construction and geographic evaluation. This approach allows any hydrostratigraphic structures relevant to groundwater flow in the Basin to be easily translated from GIS for use in other formats.

For the Bedford-Coldwater Model, three model layers were defined to simulate hydrogeologic character of the primary water-bearing sediments within the groundwater basin. The model layers are numbered from 1 through 3 from top to bottom. The top of Model Layer 1 represents the topography that is based on topographic elevation points every 10 meters were extracted from the National Elevation Dataset (http://ned.usgs.gov) throughout the model domain **Figure 10**.

The model layers represent the geologic units within each of the hydrologic areas. **Figures 11 through 13** show the areal extent and thickness of each of the model layers over the entire model domain. **Figures 14 and 15** show cross sections of the model grid along row 127 and column 230, respectively, to illustrate the shapes and relative thicknesses of the layers. The following provides a summary of the geologic units represented by each model layer in accordance with the HCM for the three hydrologic areas.

In the Bedford MA, three model layers were defined that represent the following geologic units:

- Model Layer 1 – Temescal Wash alluvium and shallow soils
- Model Layer 2 – Tertiary sedimentary units primarily the Bedford Canyon Formation
- Model Layer 3 - Weathered bedrock

The alluvium along Temescal Wash is the primary water supply unit in the Bedford MA (Todd and AKM 2008) where the larger wells are completed. The alluvial deposits are a mix of interlayered gravels, sands, silts, and clays resulting from alluvial fan and fluvial processes. Model Layer 1 ranges up to 80 feet thick along the Temescal Wash. Alluvial aquifer materials are present in other parts of this hydrologic area, but their extent and production capacity are uncertain. In these areas, Model Layer 1 represents a relatively thin layer, with a minimum thickness of five feet, that overlies the Bedford Canyon Formation that is rarely saturated.

Model Layer 2 represent the Bedford Canyon Formation that is composed of alternating slate and fine-grained sandstone, underlies alluvial deposits in this hydrologic area and is generally less than 200 feet deep (Todd and AKM 2008). It is reported to have limited groundwater production potential (Todd and AKM 2008). The bottom of Model Layer 2 is defined based on depth to bedrock data in the Bedford MA that ranges from 25 feet to approximately 500 feet (Todd and AKM 2008). Model Layer 3 represents the weathered and fractured bedrock formations underlying Model Layer 2. These basement rocks have limited produce significant groundwater except in fractures (Todd and AKM 2008).

In the Coldwater MA for the areas outside of the deep basin area that are upgradient of the Wildomar and Glen Ivy Faults, three model layers were defined that represent the following geologic units:

- Model Layer 1 – Coldwater Basin alluvial fill sediments.
- Model Layer 2 - Older Alluvial deposits
- Model Layer 3 - Weathered Bedrock

The alluvium (both young and old) that fills the deep basin in the Coldwater Basin, represented by Model Layers 1 and 2, forms the majority of the Basin aquifer. These alluvial deposits may be more than 800 feet thick locally and are composed of interfingered gravels, sands, silts, and clays (MWH 2004, Todd and AKM 2008). Groundwater is generally unconfined in these aquifer units.

Model Layer 3 represents the weathered and fractured bedrock formations underlying Model Layer 2. Domestic wells competed along the margins and along the narrow canyons that extend from the main part of the groundwater basin are completed in weathered bedrock. Model Layer 3 is represented by a uniform thickness of 75 feet in the weathered bedrock based on well logs of domestic wells along the basin margin.

4.2.5. Faults

The Basin is dominated by the Glen Ivy Fault zone that forms a partial barriers to groundwater flow in the between the Bedford and Coldwater MAs based on water level differences and on analysis of sources of groundwater recharge across the fault (MWH 2004, Todd and AKM 2008). The location of the faults applied for the Bedford-Coldwater Model are shown on **Figure 16**. For the Bedford-Coldwater Model, all faults extended across Model Layers 1 through 3.

The faults were simulated using the Horizontal Flow Boundary (HFB) Package in MODFLOW that allows by defining a conductance parameter to be placed between adjacent model cells that can act to limit groundwater flow. All of the faults were simulated as a 10-foot wide zone. The lowest fault hydraulic conductivities were applied for the faults bordering the Back Basin where the hydraulic conductivity ranged from 0.0001 to 0.00001 ft/d. The fault hydraulic conductivities were based on an initial estimate that was refined during model calibration.

4.2.6. Aquifer Conditions

Groundwater conditions for each model layer can be defined as unconfined, fully-confined, or convertible between confined and unconfined based on the relation of the simulated groundwater level to the top of the model layer. Unconfined conditions exist when groundwater levels are below the top of the physical aquifer layer whereas confined conditions exist when groundwater levels are above the top of the physical aquifer layer. For the Bedford-Coldwater Model, Model Layer 1 is defined as unconfined. Model Layers 2 and 3 are defined as convertible between confined and unconfined conditions.

Because of the historical changes in groundwater levels, areas within the Basin can be temporarily unsaturated. Prior MODFLOW versions set a dewatered cell to a no-flow condition for the rest of the simulation if the cell is dewatered. An important advantage of using MODFLOW-NWT compared to previous MODFLOW versions is that groundwater heads will be calculated for dry cells, whereas standard MODFLOW excludes these calculations (Niswonger et. al., 2011). This resaturation capability of MODFLOW-NWT was utilized for the Bedford-Coldwater Model.

In MODFLOW-NWT, cells can be reset to active using the rewetting option without setting a dewatered cell to no flow condition. MODFLOW-NWT will calculate a head in a dry cell while not allowing water to flow out of a dry cell that provides a continuous solution for groundwater flow. Inflow to a dry cell, either from adjacent cells, overlying cells, or an external source simulated by one of the stress packages, automatically flows downward to an underlying cell if there are deeper layers. A cell with head below the cell bottom has no water in storage, so changes in storage also are zero for these cells. The model accounts for this situation by setting the storage coefficient for a dry cell to zero. This allows for the continuous solution of head not to affect the overall water balance results (Niswonger et. al., 2011).

Because groundwater heads are calculated for dry cells using this approach, it is necessary for the model user to interpret the head in a cell relative to the cell bottom. If the head in a cell is at or below the cell-bottom altitude, then the water table is not contained within this cell (Niswonger et. al., 2011).

4.3. BOUNDARY CONDITIONS

Model boundary conditions represent the hydrologic budget by simulating where groundwater enters and exits the basin. Boundary condition data must be entered for each stress period at each model grid cell where a boundary condition is defined in the model. MODFLOW NWT provides a number of boundary condition options to numerically represent the different physical processes included in the hydrologic budget. The physical distribution and volumes of groundwater inflow and outflow for each budget component needs to be accounted for geographically within the model domain. A discussion of each boundary condition of the groundwater budget is provided below.

4.3.1. Surface Recharge

The surface recharge includes the contributions from precipitation and return flows within the Bedford-Coldwater Model. The surface recharge is applied using zones that are defined by the geology and land use. Surface recharge is applied using the MODFLOW recharge package and using the methods outlined below. This summary discusses implementation of surface recharge into the Bedford-Coldwater Model.

4.3.2. Streams

The groundwater model dynamically simulates groundwater recharge from stream percolation and groundwater discharge into streams. Percolation from streams is a function of stream flow and—where the water table is equal to or higher than the stream bed elevation—the difference in water level between the creek and water table.

The MODFLOW stream flow routing (SFR2) package is used to simulate these processes. Each stream in the basin is simulated as a sequence of reaches, each of which is a model grid cell along the alignment of the channel. Flow is specified at the upstream end of each stream segment and routed down the reaches, with flow to or from the aquifer calculated on the basis of wetted channel area, channel bed hydraulic conductivity and the difference in elevation between the stream surface and the simulated groundwater level at that reach. By this means conservation of mass is applied concurrently to the stream and the aquifer. Streams can dry up completely as they cross the basin; and conversely, groundwater discharge can create stream flow in a segment that is dry farther upstream. The stream flow routing module allows for a network of channel segments, with multiple inflows or diversions at the start of each segment.

The Bedford-Coldwater Model includes a network of 43 stream segments containing a total of 1,363 stream reaches (**Figure 17**). Twenty-two segments are used to simulate eleven streams that drain watersheds in the Santa Ana Mountains along the west side of the Basin. Streams that flow across the Coldwater MA onto the Bedford MA where they connect up with Temescal Wash are divided into multiple segments to represent varying underlying geologic conditions. Temescal Wash is composed of thirteen segments that represent reaches along Temescal Wash. Five segments represent the short sections of five streams that drain watersheds in the Estelle Mountain and other upland areas east of Temescal Wash. Three segments represent internal drainage within the Basin the receive valley floor runoff in the northern Bedford MA.

In general, most stream reaches are more than 20 feet above the water table and are not hydraulically coupled to groundwater. Percolation from those reaches is independent of groundwater levels and not affected by pumping. Reaches where groundwater appears to be hydraulically coupled to surface water primarily include most of the length of Temescal Wash, and the lower ends of some larger tributaries as they approach the wash. All streams in the Coldwater MA are detached from the groundwater except for limited areas in the small canyons along the western basin margin.

Stream bed permeability was estimated by model calibration. Calibrated values ranged from 0.1 to 1.0 feet per day (ft/d). The relationships of stream width and depth to stream flow were divided into two categories. For small tributary streams, the relationships were patterned after measured data at the Coldwater Canyon gage. Inflows for Temescal Wash are coordinated with output from the Elsinore Valley numerical model and the USGS gauge located downstream of Lee Lake just south of the basin boundary with the Basin.

To develop estimates of surface and subsurface inflows from these tributary areas to the groundwater basin, a rainfall-runoff-recharge model is used to simulate the entire watershed tributary to the Basin. This model simulates all near-surface hydrologic processes, including rainfall, runoff, infiltration, evapotranspiration, effects of impervious areas and irrigation, soil moisture storage and percolation to stream base flow and deep groundwater recharge. The calculated runoff is included in the SFR2 Package.

4.3.3. Mountain Front Recharge

Groundwater inflow into the basin from adjacent uplands—also called mountain front recharge—were calculated by the rainfall-runoff-recharge model (see Section 3). Mountain front recharge represents subsurface inflow of groundwater from the low-permeability rocks adjacent from the surrounding watershed to the groundwater Basin. the MODFLOW General Head Boundary (GHB) package was applied along the basin margin in Model Layer 3 which represents the weathered bedrock. The distribution of the GHB cells is shown on **Figure 18.**

The GHB package is a head dependent boundary condition; therefore, the amount of groundwater flowing into or out of this boundary was influenced by the relative hydraulic gradient between the basin and the boundary condition. To have the GHB package input the bedrock inflows determined by the rainfall-runoff-recharge model (see Section 3), the GHB was set up to act as a rate limited flux boundary. To do this, the reference head was a considerable distance away (one mile) from the recharge location, so it is well above the groundwater levels in the model. The conductance and elevation terms for the GHB package were back-calculated to get the appropriate flux. By setting the head at distance, the variability due to the changing heads in the groundwater model produces a variation of 1 to 2 percent in the GHB flux compared to the rainfall-runoff-recharge model values. The advantage of this approach is that the bedrock inflow can more easily be distributed to a large number of cells along the basin margin to maintain simulation stability. In addition, this approach allows the Bedford-Coldwater Model to simulate a consistent groundwater gradient flowing away from the margins to be consistent with the HCM.

4.3.4. Evapotranspiration

Evapotranspiration (ET) represents groundwater outflow from evaporation to the atmosphere and uptake by plants from the saturated zone. This is distinct from ET associated with soil moisture before it reaches the groundwater aquifer that is sustained by the total available precipitation not accounted for by runoff or recharge (see Section 3).

The MODFLOW Evapotranspiration (EVT) package is used simulate ET directly from the groundwater aquifer. ET is defined over the entire model domain; however, ET only occurs in areas of shallow groundwater. In the Basin, this is generally limited to riparian areas adjacent to streams. ET includes uptake from both phreatophytes (plants that require groundwater) and mesophytes (plants that can utilize groundwater) either directly from the saturated zone or from the overlying capillary fringe (Meinzer, 1927; Robinson, 1958; and Lewis and Burgy, 1964). ET from the capillary fringe is replenished with groundwater from the underlying aquifer, so it is also considered a loss of groundwater (Lubczynski, 2011).

The MODFLOW EVT package that the ET rate decreases with increasing depth to the water table because fewer shrub and tree roots are able to reach the water table and the energetics of withdrawing the water become less favorable. In the groundwater model, the consumptive use of groundwater due to ET decreases from the maximum rate when the water table is at the land surface and diminishes linearly down to zero when the water table reaches the extinction depth for that location.

In the Bedford-Coldwater Model, three ET zones were defined as shown on **Figure 19**. The first zone represents locations where aerial photographs indicate the presence of dense, lush riparian vegetation indicates areas of shallow groundwater where the plants (phreatophytes) can regularly uptake water directly from the water table to meet evaporative demand. These occur along the Temescal Wash and in the upper portions of some of the canyons along the basin margin. The extinction depth for these locations was set at 15 feet below the ground surface. Over most of the remaining model domain, the extinction depth was set at 7.5 feet to represent the vegetation in these areas. The third area represents areas where quarry lakes exist where the extinction depth was set at 3.0 feet to represent evaporation off of ponded water that periodically exists in these quarry areas. ET rates applied in the Bedford-Coldwater Model use the ET data from the rainfall-runoff-recharge model (see Section 3).

4.3.5. Groundwater Pumping

Groundwater pumpage is the most significant groundwater outflow component for the basin. Groundwater users in the Basin are required to report their pumping to Western Municipal Water District, which is one of several agencies responsible for administering adjudication decrees in the Upper Santa Ana River Watershed area. Thirty-eight wells within the Basin produced groundwater in one or more years during 1990-2018, and the reported annual pumping amounts were obtained from WMWD. **Figure 20** shows the locations of pumping in the Basin. Locations of agricultural pumping are distributed based on the estimated agriculture pumping requirements calculated using the rainfall-runoff model (**Figure 21**).

Annual production by all of the wells generally increased from 1990 to about 1999; however, from 2000 through 2007 annual production stabilized at about have the 1990-1999 rates, as shown in **Figure 22**. All pumping wells are included as analytical elements that are simulated by the MODFLOW well package in the model. **Table 2** presents the overall trend in average annual groundwater pumping over time along with the assigned model layer for each well. In 2008, the City of Corona and Elsinore Valley Water District came to an agreement to limit groundwater pumping

The citrus groves in the Basin were presumed to be irrigated by groundwater, although that pumping does not appear to be included in the WMWD production records. The amount of irrigation was estimated using the rainfall-runoff-recharge model and was assigned to hypothetical well locations at the center of each citrus recharge polygon. Some rural residences might be served by on-site domestic wells. The amount of pumping at those wells is assumed to be negligibly small in the context of the overall groundwater budget. Small domestic wells are not included in the WMWD database and are not included in the model.

4.3.6. Recycled Water Recharge Ponds

Reclaimed wastewater is percolated in ponds at the TVWD Water Reclamation Facility (WRF) (**Figure 23**). However, most of the reclaimed water is recycled for irrigation. Annual or monthly data describing the partitioning of reclaimed water into irrigation, pond percolation and discharge to Temescal Wash were obtained from TVWD and the City of Corona.

Discharges from the TVWD Water Reclamation Facility (WRF) to Temescal wash were discontinued in 2013. All of the plant outflow is recycled for irrigation during spring, summer, and fall (assumed April through November), and most or all of it is percolated in ponds at the WRF when irrigation demand is low (December through March). In recent years more of the outflow from the TVWD WRF has been percolated in ponds than has been recycled for irrigation. This proportion was assumed to reverse, such that all outflow would be recycled for irrigation during April through November and all would be percolated in ponds during November through March.

The MODFLOW Well Package was used to simulate recharge at the WRF recharge ponds. The wells were simulated as recharge wells. The volume of flow was distributed evenly over the area of the ponds. Prior to 2008, the recycled water recharge was applied to recharge located just south of the TVWD WRF. Starting 2008, recycled water recharge was applied to new recharge ponds located just north of the TVWD WRF. The simulated recharge locations are shown on **Figure 24**.

4.3.7. Quarries

Sand and gravel mining has been the predominant industrial land use in the southern half of the Coldwater MA, an activity that continues today. Localized sand and gravel operations are also located along Temescal Wash in the Bedford MA (**Figure 23**). In addition, berms along washes, diversions of surface water, and the presence of large gravel pits enhance groundwater recharge of runoff in Coldwater area (Todd and AKM, 2008).

Discharge from the Coldwater MA quarry operations is from groundwater pumping, evapotranspiration, and other mining operations (MWH, 2004, Todd and AKM 2008). Losses also occur when the sand and gravel from the gravel pits, which contains groundwater used for washing, is transported from the Coldwater Basin. The estimated losses from gravel operations range from about 300 acre-feet per year (ft/yr to more than 900 acre-ft/yr (MWH, 2004). The average losses are approximately 700 acre-ft/yr (MWH, 2004). Quarry outflows were simulated using a combination of the EVT and Drain Packages. The ET rate and drain conductance were varied during model calibration to simulate the average annual losses from the MWH (2004) report that are listed above. The location of the boundary conditions for the Coldwater MA quarry operations are shown on **Figure 24**.

Quarry recharge represents inflows of surface water into existing quarries where it is allowed to recharge into the groundwater. In the Coldwater MA, streamflow from Mayhew Creek and some other smaller streams are directed into existing quarry areas where the water is contained and allowed to percolate. Coldwater Creek has been redirected around an existing quarry. Although Coldwater Creek is not currently directed into a quarry, there have been historic instances where flood flows have gone into the quarries, especially prior to 2005. A portion of the estimated streamflow from the rainfall-runoff-recharge model for each stream is recharged to groundwater at the quarry location. This recharge from streamflow directed into the quarries is simulated using the MODFLOW well package. A portion of the monthly streamflow assigned from the rainfall-runoff model was moved from the SFR2 Package to the Well Package to simulate quarry inflow recharge.

In the Bedford area, the Mobile Sand quarry located just north of the Temescal WRF is open to potential outflows to Temescal Wash. To estimate groundwater outflows from the quarry pit during high groundwater levels, the MODFLOW model applies a boundary condition based on the observed water level in the pit to estimate the volume of quarry outflow. This is a head-dependent boundary condition that is able to calculate either quarry recharge or outflow based on groundwater conditions. This was simulated using the MODFLOW river package. Since we can estimate the water surface based on topography, the River Package can allow the quarry pit ponds to alternative from recharge to discharge based on monthly hydrologic conditions.

Quarry recharge in the Bedford MA is from streamflow from Brown and McBride Creeks flow into the Mobile Sand quarry located just north of the TVWD WRF. In addition, streamflow from Temescal Wash can flow into the quarry location especially during high and flood flows. The quarry pit at this location is below the water table and is consistently flooded. To estimate the recharge, the MODFLOW model applies a boundary condition based on the observed water level in the pit to estimate the volume of quarry recharge. Similar to the Coldwater MA quarry recharge, recharge from streamflow directed into the quarries is simulated using the MODFLOW well package. A portion of the monthly streamflow assigned from the rainfall-runoff model was moved from the SFR2 Package to the Well Package to simulate quarry inflow recharge.

4.3.8. Subsurface Flow with Adjacent Groundwater Basins

To simulate potential subsurface groundwater and outflow with adjacent groundwater basins, a specified head boundary was defined using the MODFLOW constant head package. Constant head boundaries allow sufficient inflow or outflow at that model cell to achieve the specified head. Where the Basin adjoins the Elsinore Valley and Temescal Basins, at the north and south ends of the model respectively, represent a very small percentage of the overall perimeter of the Basin.

Along the Elsinore Subbasin boundary, a constant head boundaries were set along a limited length of the boundary near Temescal Wash and another unnamed stream (**Figure 24**). The constant head along Temescal Wash was set at 1046.5 feet in Model Layer 2 and 3. Along the unnamed stream, the constant head was set at 1068.0 feet in Model Layer 2 and 3.

Along the Temescal Subbasin boundary, a similar set of constant head boundaries were set along a limited length of the boundary near Temescal Wash and another unnamed stream (**Figure 24**). The constant head along Temescal Wash was set at 765.0 feet in Model Layers 1, 2 and 3 for the first three years, and then set to 775.0 feet for the following twenty-six years. The constant head boundaries were based on an initial estimate that was refined during model calibration.

4.4. AQUIFER PROPERTIES

Aquifer properties represent the physical and hydrogeologic characteristics of the aquifers within the Basin that control groundwater flow. Aquifer properties must be assigned to each active grid cell in the model. The conceptual model provides the framework necessary to define aquifer properties.

4.4.1. Aquifer Characteristics

The groundwater model represents the basin fill materials in terms of their ability to store and transmit groundwater. Horizontal and vertical hydraulic conductivity define the permeability of the aquifer, which is its ability to transmit groundwater flow. The ability to store water consists of two components. At the water table, storage of water associated with filling or draining the empty (air-filled) interstices between mineral grains is represented by the specific yield of the aquifer. In deep aquifers, there is a much smaller ability to store and release groundwater that derives from the compressibility of the water and aquifer materials (specific storativity). Thus, the initial response to pumping from a deep aquifer is a large drop in water level (head) within that aquifer. With sufficient time, however, the decrease in head creates downward movement of groundwater that eventually accesses the storage capacity at the water table. In other words, the storage response of the aquifer depends partly on the duration of pumping and observation. For groundwater management purposes, storage responses over periods of months to decades are usually the most relevant.

Aquifer characteristics can be estimated in two ways. The first is by means of an aquifer test in which one well is pumped while water levels are measured at a nearby well. This approach typically measures horizontal hydraulic conductivity over distances of tens to hundreds of feet and storage responses over periods of 1-3 days. The second approach is to calibrate a groundwater flow model such that the aquifer characteristics reproduce measured historical water levels throughout the basin given estimates of historical recharge and pumping. The latter approach produces estimates of aquifer characteristics averaged over spatial scales of thousands to tens of thousands of feet and time scales of months to decades. The estimates account for preferential flow through localized sand and gravel lenses in the basin fill materials and for delayed water-table responses to deep pumping. Also, model calibration provides estimates of vertical hydraulic conductivity across the layers of alluvial deposits, which is rarely measured by aquifer tests. The temporal and spatial scales represented by the model calibration approach are better for addressing most long-term groundwater management questions.

4.4.2. Zone Approach

Because of the limited data for aquifer properties for the Basin, a zoned distribution pattern was used that applied aquifer properties over subregional areas with similar geologic conditions. Although the units are heterogeneous, the approach was to get a representative average value for each aquifer property for limited number of zones around the basin. This was to avoid the patchwork quilt type of aquifer property distribution that does not show any relation to the underlying geologic conditions that define the aquifer property.

Figures 25 shows the distribution of aquifer characteristics after calibration of hydraulic conductivity and specific storage, respectively. The initial estimates of hydraulic conductivity and specific yield were from available local data, which incorporated major geologic features such as relatively permeable sediments in the upper parts of alluvial fans.

4.4.3. Hydraulic Conductivity

Hydraulic conductivity represents the ability of the water to flow through the aquifer, and is defined horizontally within a model layer to represent groundwater flow through the aquifer and vertically between adjacent model layers to represent groundwater exchange between aquifers.

The definition of the horizontal hydraulic conductivity is based on an assessment of lithologic description, available aquifer test data and model calibration. Since each model layer represents a thick interval composed of varying lithologies, the horizontal hydraulic conductivity represents an average value over the entire vertical thickness that includes the finer-grained layers in addition to any specific sand and gravel zone. For the Bedford-Coldwater Model, horizontal hydraulic conductivity is defined using regionalized blocks based on the geologic character of the unit and refined during calibration.

The hydraulic conductivity used in the Bedford-Coldwater Model varies within a reasonable value range for the aquifer characteristics for each aquifer to achieve the model calibration. The horizontal hydraulic conductivities used in the Bedford-Coldwater Model are listed in **Table 3.**

4.4.4. Vertical Conductance

In general, groundwater flow within an aquifer is dominantly horizontal whereas flow between adjacent aquifers is essentially vertical. The application of vertical hydraulic conductivity recognizes the inherent isotropy present in natural geologic formations. Vertical groundwater flow is equivalent to Ohm's Law for serial electrical flow through different resistivity layers. Based on this analogy, vertical groundwater flow, similar to serial electrical flow, is limited by the lowest conductivity (or highest resistivity) layer encountered. Therefore, vertical groundwater flow is defined by the lowest-permeability, continuous layer that controls the exchange of groundwater between aquifer or model layers.

In MODFLOW, vertical groundwater flow between model layers is calculated using vertical conductance (VCONT) that is calculated as the conductance of two one-half cells in a series with continuous saturation between them (Harbaugh, 2005). This calculation is performed within MODFLOW and requires the input of a vertical hydraulic conductivity (Kz) for each layer. In general, Kz values were set to allow relatively free exchange between layers. The vertical hydraulic conductivity values used in the model to calculate the VCONT are summarized in **Table 3**.

4.4.5. Specific Yield and Specific Storage

Aquifer storage defines the ability of the aquifer to take in or release water. Under unconfined conditions, water released from or put into aquifer storage represents the physical draining of groundwater from interstitial pore space within the aquifer. Unconfined storage is defined by specific yield, which is typically consistent with the effective porosity of the aquifer. Under confined conditions, water released from or put into aquifer storage is derived from the compressibility of water as a result of changes in the aquifer pressure within the interstitial pore space.

MODFLOW 2005 requires the use of specific storage, which is in the units of feet^{-1}. Reasonable ranges for the specific yield and specific storage were varied within a reasonable range during the model calibration and the values are listed in **Table 3**, respectively.

4.5. INITIAL CONDITION

The model also requires that groundwater levels be specified at the start of the simulation. They were estimated based on contouring of available water level data. As the initial heads may be dynamic and not representative of stable initial conditions, the first stress period representing pre-1990 conditions were run as steady-state to facilitate the calculation of a stable hydrologic system.

The transient model was used to develop the initial groundwater elevations that serve as the starting condition for the transient model. For this, groundwater pumping was applied to represent the long-term average pumping prior to 1990. The surface recharge component used to estimate groundwater recharge was set to a predevelopment condition to reduce the effect of urbanization. The results of the transient model provided a reasonable groundwater elevation data representing the late 1980's to obtain an appropriate starting condition. This was an iterative process and the transient model used to develop the initial head was updated during the transient model calibration to incorporate significant changes in the model setup. **Figure 26** provides the starting head for Layers 2, which provides a reasonable representation of the groundwater conditions for Layers 1 and 3.

5. HISTORICAL MODEL RESULTS

The Bedford-Coldwater Model was calibrated using the developed calibration criteria to reduce uncertainty by matching model results to observed data. An extensive calibration process was designed to better constrain the range of aquifer properties and boundary conditions for the model, thereby reducing uncertainty in the results.

5.1. CALIBRATION METHODOLOGY

For the Bedford-Coldwater Model, the simulation is setup using a 29-year base period that covers Water Year (WY) 1990 to WY2018. This aspect of the calibration is important to demonstrate that the model has the capability to simulate historical changes in groundwater elevations, and is therefore capable of forecasting future changes in groundwater elevations. This capability is necessary for the model to serve as a useful groundwater management tool.

5.1.1. Approach

The transient calibration is a process that compares the simulated groundwater levels from the model to observed groundwater level measurements. During calibration, boundary condition parameters and aquifer properties are varied within the reasonable range defined by the hydrogeological conceptual model. Different combinations are tested to determine the set of parameters and properties that produce an acceptable correlation simulated to measured groundwater elevations over time. Other data sets, such as key water budget components, surface water conditions, or hydrogeological conceptual model, may be used to further constrain the calibration.

There are multiple combinations of aquifer properties and boundary conditions that can be used to match a single set of groundwater elevation data. Calibrating to multiple data sets under differing stresses (i.e. recharge and discharge rates) reduces this “non-uniqueness”, thereby reducing the uncertainty. Performing a comprehensive calibration over a 29-year base period infers the calibration has been performed over wet, dry, and normal years with varying degrees of pumping. To that end, the Bedford-Coldwater Model was primarily calibrated using groundwater levels. The measures of calibration are primarily from a statistical analysis along with a visual assessment groundwater level trends from hydrographs. The groundwater elevation maps and water budget data considered during the model calibration are assessed in context with the model results, so are discussed in the next section.

5.1.2. Calibration Methodology

Joint calibration of the rainfall-runoff-recharge model, the surface water budget models and the groundwater flow model applied heuristic methods (i.e. trial-and-error adjustments) to selected variables, as informed by the timing and location of model residuals. In accordance with the principle of parsimony in modeling (DWR, 2016), calibration began with a small number of broad zones for hydraulic conductivity and storage. Zones were subdivided during calibration if a pattern of residuals at multiple wells warranted it. Although storage and hydraulic conductivity are not necessarily correlated, in practice they often are to some degree. Thus, for simplicity, similar zonation patterns were used for both variables.

In practice, most of the calibration effort focused on adjustments to horizontal and vertical hydraulic conductivity, the locations and conductances of faults, stream bed vertical hydraulic conductivity, and several tributary watershed parameters: root depths of natural vegetation, rainfall-runoff thresholds and slopes, and the leakage and recession rates for shallow groundwater. Variables that were not adjusted during calibration include land use, crop root depths, pumping locations, and groundwater pumping.

Model performance during the calibration process was evaluated primarily by visual inspection of superimposed measured and simulated water-level hydrographs. Adjustments to model inputs and parameters were made only if two or more wells in a given area exhibited similar patterns of discrepancies between measured and simulated water levels. The process of manually calibrating a groundwater model also produces considerable insight into the groundwater flow system and the factors that influence it. Water levels for some wells were easy to reproduce with the model, while others were more difficult.

5.1.3. Primary and Alternative Calibration

In this report, we provide two sets of calibration results. Primarily, this was done to provide two variations for simulating the quarry operations in the Coldwater MA. These two calibration versions include:

- Primary Calibration – the Primary Calibration is the version of the historical model that is carried forward as the final model calibration that is used as the based for the projected future scenarios.
- Alternative Calibration – the Alternative Calibration is presented to demonstrate that uncertainty regarding the quarry operations, primarily in the Coldwater MA, may indicate a data gap. The Alternative Scenario is presented for informational purposes to document this work for future model updates, but it is not used for the projected future scenarios.

Quarry outflows represents outflows associated with active or passive quarry operations to account for observed water conditions within the deeper quarry pits. In the Coldwater area, excavations occur within the large quarry pits following periods of high groundwater levels for the period from 1990 to 2010. Based on available information, no additional pumping to maintain quarry water levels was assumed to occur. However, during model calibration, it was necessary to assume that additional pumping or other groundwater removal occurred during these operational periods to maintain the observed groundwater levels.

For the Primary Calibration, quarry outflows were simulated using a combination of the EVT and Drain Packages (**see Section 4.3.7**). From 1990 to 2010, the quarry outflows were allowed to be higher assuming some limited additional pumping may have occurred. However, after 2010, no additional pumping to maintain quarry water levels has occurred and that is supported by the historical model calibration. The ET rate and drain conductance were varied during model calibration to simulate the average annual losses from the MWH (2004) report. However, the calibration results (see following discussion) did not fully capture the high and low observed groundwater near the Coldwater MA quarries.

For the Alternative Calibration, a different simulation method was applied at the quarry locations. The emphasis of the Alternative calibration was to apply a boundary condition that would more forcefully simulate the observed groundwater levels. For the Alternative Calibration, the quarry operations were simulated using the MODFLOW river package. The River Package can allow the quarry pit ponds to alternate from recharge to discharge based on monthly hydrologic conditions. We estimated the water surface based on a review of Google Earth satellite images of the quarries and other local reports.

5.2. STATISTICAL CALIBRATION

The calibration was evaluated using a statistical comparison of difference (or residual) between measured and simulated groundwater elevations. The calibration was done for the entire Subbasin. In addition, a breakdown of the calibration results for each of the management areas is also provided.

5.2.1. Primary Calibration Results

For the Basin, the calibration is based on observed groundwater elevations from 3,736 measurements in 27 wells over the 29-year base period from October 1989 through September 2018 (WY1990-2018). The locations of these wells are shown on **Figures 27 and 28** for the Bedford MA and Coldwater MA, respectively.

Next, a more rigorous calibration was performed involving a statistical analysis to compare the difference or residual between measured and simulated groundwater elevations. An initial comparison is made with a scatter plot (**Figure 29**) that depicts this relationship of observed versus simulated groundwater elevations. As indicated on **Figure 29**, the scatter along the correlation line is minor in comparison to the range of the data. The correlation coefficient for the data on this graph is 0.905. The correlation coefficient ranges from 0 to 1 and is a measure of the closeness of fit of the data to a 1 to 1 correlation. A correlation of 1 is a perfect correlation. The correlation coefficient of 0.905 indicates a strong correlation between simulated and observed groundwater elevations.

A more detailed statistical analysis is provided that compares the difference, or residual, between measured and simulated groundwater elevations. **Table 4** summarizes statistical measures used to assess the calibration. A brief summary of the statistical measures used to evaluate the calibration results shown on **Table 4** is summarized below:

- The residual mean is computed by dividing the sum of the residuals by the number of residual data values. The closer this value is to zero, the better the calibration especially as related to the water balance and estimating the change in aquifer storage. The residual mean is 16.0 feet.
- The absolute residual mean is the arithmetic average for the absolute value of the residual so it provides a measure of the overall error in the model. The absolute residual mean is 42.1 feet.
- The residual standard deviation evaluates the scatter of the data. A lower standard deviation indicates a closer fit between the simulated and observed data. The standard deviation for the calibrated model is 31.5 feet.
- The Root Mean Square (RMS) Error is the square root of the arithmetic mean of the squares of the residuals is provides another measure of the overall error in the model. The RMS Error for the calibrated model is 45.0 feet.
- The scaled absolute residual the ratio of the absolute residual mean is divided by the range of observed groundwater elevations. This ratio helps to put the variation of the residuals into perspective with respect to the scale of the groundwater basin. This ratio for the Bedford-Coldwater Model is 0.077, which puts the statistical variability at less than 8 percent of the range. A ratio below 0.15 is generally considered a well calibrated (ESI 2011).

It should be noted that some degree of difference (or residual) between the observed and simulated groundwater elevations is expected. Residuals may be due in part to localized effects or data quality issues. For example, residuals can result from using groundwater elevations from pumping wells as calibration targets. MODFLOW calculates the groundwater elevation for the center of a model cell rather than at the well location itself. MODFLOW also does not consider the impact of well efficiency on groundwater elevations at pumping wells. In addition, the timing of the observed groundwater elevations does not exactly match the model stress periods. Since the several calibration locations being pumping wells, the statistical parameters are considered reasonable indicating that the model is well calibrated. **Table 5 (following text)** provides a summary statistics for each of the 59 wells used in the calibration process.

Table 4. Summary of Primary Calibration for the Bedford-Coldwater Model

Calibration Measure	Complete GW Basin	Bedford MA	Coldwater MA
Units	**Feet**	**Feet**	
Residual Mean	16.0	1.0	26.5
Residual Standard Deviation	42.1	11.2	97.0
Absolute Residual Mean	31.5	8.1	47.8
Root Mean Square (RMS) Error	45.0	10.9	22.4
Scaled Absolute Residual Mean	0.077	0.034	0.084
Number of Locations	27	13	14
Number of Observations	3,736	1,535	2,201

The statistical comparison is also consistent when evaluated by management area (MA). **Table 4** includes the statistical calibration results for the Bedford-Coldwater Model by MA. The residual mean varies from 1.0 feet in the Bedford MA to 26.5 in the Coldwater MA. The standard deviation ranges from 11.2 feet in the Bedford MA to 97.0 feet in the Coldwater MA. The absolute residual mean ranges from 8.1 feet in the Bedford MA to 47.8 feet in the Coldwater MA. The scaled absolute residual mean ranges from 0.034 in the Bedford MA to 0.084 in the Coldwater MA.

The higher variability indicated in Coldwater MA is primarily attributed to the greater number of groundwater levels from active pumping that increases the variability of the observed data over the calibration period. Conversely, the Bedford MA has less variability because of less groundwater pumping and narrow range in groundwater levels over the calibration period. The statistical results are of high quality and indicate that each MA is well calibrated.

5.2.2. Alternative Calibration Results

For the Alternative Calibration, the boundary conditions were adjusted to simulate the observed groundwater levels more forcefully with no limitations on the effect on the water budget. For the Alternative Calibration, the quarry operations were simulated using the MODFLOW river package. The River Package can allow the quarry pit ponds to alternative from recharge to discharge based on monthly hydrologic conditions. We estimated the water surface based on a review of Google Earth satellite images of the quarries and other local reports.

A comparison of the statistical analysis for the Coldwater MA between the Primary and Alternative Calibration is provided in **Table 6**. A brief summary of the statistical measures used to evaluate the calibration results for the Coldwater MA are summarized on **Tables 4 and 6** below:

- The residual mean for the Alternative Calibration is -4.3 feet compared to 26.5 feet for the Primary Calibration.
- The absolute residual mean for the Alternative Calibration is 87.2 feet compared to 97.0 feet for the Primary Calibration.
- The residual standard deviation for the Alternative Calibration is 29.7 feet compared to 47.8 feet for the Primary Calibration.
- The Root Mean Square (RMS) Error for the Alternative Calibration is 20.1 feet compared to 22.4 feet for the Primary Calibration 45.0 feet.
- The scaled absolute residual ratio for the Alternative Calibration is 0.055 feet compared to 0.084 for the Primary Calibration.

The water budget results were considered to be unrealistically high for quarry operations, so they are not provided and the Primary Calibration is the selected calibration results for the GSP. However, the Alternative Calibration indicates that a significantly improved model calibration but this is currently limited by potential uncertainty regarding the historical quarry operations. Therefore, the Alternative Calibration suggests that the quarry operations present a potentially significant data gap moving forward. Therefore, an improved understanding quarry operations may help to enhance future model calibration.

Table 6. Summary of Alternative Calibration for the Bedford-Coldwater Model

Calibration Measure	Complete GW Basin	Bedford MA	Coldwater MA
Units	Feet	Feet	
Residual Mean	-1.6	2.2	-4.3
Residual Standard Deviation	30.9	11.4	87.2
Absolute Residual Mean	21.3	9.2	29.7
Root Mean Square (RMS) Error	30.9	11.3	20.1
Scaled Absolute Residual Mean	0.044	0.038	0.055
Number of Locations	27	13	14
Number of Observations	3,736	1,533	2,201

5.2.3. Comparison to Previous Model Calibration for Coldwater MA

The primary performance measure is to improve upon the calibration from the previous models. Previous groundwater models have been developed for the Coldwater MA; however, no previous groundwater model exist for the Bedford MA. In the MWH (2004) report, the model calibration results listed in the report was a general goal of a residual mean of less than 40-feet over the 1977 to 2010 simulation period. Both the Primary and Alternative Calibration both have residual means that are

- The residual mean of 26.5 feet for the Primary Calibration (**Table 4**) for the 2021 GSP Model is an improvement of 34 percent compared to the 2004 MWH Model.

- The residual mean of -4.3 feet for the Alternative Calibration (**Table 6**) for the 2021 GSP Model is an improvement of 89 percent compared to the 2004 MWH Model.

Overall, the results of the calibration showed significant improvement in the calibration over the 2004 MWH model. Although the data points used for both versions of the models are the same, the number of observations did vary. This indicates that the changes implemented for the Bedford-Coldwater Model were successful and resulted in improved model performance.

5.3. GROUNDWATER LEVEL TRENDS

Hydrographs provide a detailed time history of groundwater elevations for specific wells. This time history data includes the impact of varying climatic and pumping stresses on the groundwater basin. Comparing hydrographs of model results versus observed data provides a measure of how well the model handles these changing conditions through time. Groundwater elevation data for 26 hydrographs from different parts of the basin are included on **Figures 30 through 36** for the hydrograph evaluation. Locations of these well used for the hydrographs are shown on **Figures 27 and 28**.

For calibration purposes, the hydrographs were inspected to evaluate how well the model results matched the overall magnitude and trend of the observed groundwater elevation data over time. For the transient model, it was considered more important to honor the overall trend of the data. A hydrograph was considered a good match if the model simulated the trend, but the groundwater elevations were offset. The following is a discussion of the overall groundwater trends, comparison of simulated to measured data, and other hydrogeological inferences made from the historical simulation results shown on the **Figures 30 through 36** hydrographs.

5.3.1. Bedford MA Hydrographs

Hydrographs from twelve wells located in different areas within the Bedford MA are shown on **Figures 30 through 32**. Well locations are shown in **Figure 27**. To facilitate a comparison of the relative groundwater trends observed in these wells, a consistent vertical scale of 250 feet is used on **Figures 30 through 32**.

The North Temescal Wash Area is located along Temescal Wash in the northern portion of the Bedford MA. **Figures 30 and 31** show hydrographs for 8 wells located within this area. Groundwater levels in this area are generally characterized as having relatively stable trends over time. Also, depth to groundwater in many parts of this area are relatively shallow ranging from 5 to 50 feet. Data from Corona #4 prior to 1992 show that groundwater levels were lower during this period. Groundwater levels were relatively stable. From 2012 through 2018 groundwater levels become more variable reflecting changes in groundwater pumping and climatic conditions.

Hydrographs for four monitoring wells are located in the mid-Temescal Wash (**Figure 32**). Locations of these wells are shown on **Figure 27**. Three of these wells are located area near the TVWD WRF (TVWD#01A, TVWD#04, and LLWD_#01-Old). These wells show very stable water levels over the period of record. In this area, groundwater levels are stabilized by the level of Temescal Wash and the presence of two flooded gravel mine pits in the mined area north of TVWD WRF.

The New Sump well, also shown on **Figure 32**, a is located further upstream from the TVWD WRF near the confluence with Dawson Creek which flows in from the upland areas to the east. Groundwater levels show more variability due to pumping at this location and the narrow constricted configuration of the aquifer at this location.

For all twelve wells, the comparison of simulated to measured groundwater levels shows a close correlation which is consistent with the statistical data presented on Tables 4 and 5.

5.3.2. Coldwater MA Hydrographs

Hydrographs from thirteen wells located in different areas within the Coldwater MA are shown on **Figures 33 through 36**. Well locations are shown in **Figure 27**. To facilitate a comparison of the relative groundwater trends observed in these wells, a consistent vertical scale of 600 feet is used on **Figures 33 through 36** to capture the full range and variability of groundwater levels in the Coldwater MA.

Figures 33 shows hydrographs for four wells located within in the Coldwater Creek area of the Coldwater MA. These wells are located near the Chandler gravel mining operations which is the northernmost gravel pit (**Figure 23**). It is in the Coldwater MA that the difference between the Primary and Alternative Calibration are most apparent. The measured groundwater levels for the four hydrographs on **Figure 33** shows a consistent pattern that is summarized below:

- From 1989 through 1992, groundwater levels are relatively low, with elevations ranging between 800 to 900 feet above mean sea level (msl). This is considered to represent a period of active mining operations and deepening of the pits to near or below the water table.
- During the period from 1993 through 1999, groundwater levels rapidly rise in 1993 due to flood events where flood flows are either directed into or breached berms to flood the mining areas. The result is a major recharge event during high rainfall events in 1993, 1995, 1997 and 1998. As a result, groundwater levels rise 150 to 200 feet to reach elevations between 1,000 and 1,050 feet elevation msl.
- From 2000 through 2004, groundwater levels decline between 100 to 200 feet with elevations ranging between 750 to 850 feet above mean sea level (msl). This is a period of active mining in the large, deep mining areas.
- In 2005, another large flooding event occurred that results in major recharge event with groundwater rising about 100 feet to reach elevations between 850 and 900 feet elevation msl.
- From 2006 through 2010, groundwater levels decline between 100 to 150 feet with elevations ranging between 750 to 800 feet above mean sea level (msl). This is a period of active mining in the large, deep mining areas.
- In 2010 and 2011, another large flooding event occurred that results in major recharge event with groundwater rising about 100 feet to reach elevations between 850 and 900 feet elevation msl.
- From 2011 through 2016, groundwater levels decline between 100 to 150 feet with elevations ranging between 750 to 800 feet above mean sea level (msl). This is a period of active mining in the large, deep mining areas and mine reclamation.
- From 2016 to 2018, groundwater levels rise about 50 feet to an elevation of about 800 feet msl. This represents a period where mining operations are occurring well above the water table. Deeper areas of the mine have undergone reclamation and are no longer active.

During model calibration, this pattern of groundwater elevation changes was not fully obtained by using reported pumping volumes, streamflow from the rainfall-runoff model, and local ET rates. The general form was achieved, but not the full extent, especially the high groundwater levels in the 1990s. The Alternative Calibration applied a boundary condition to more forcefully drive the simulation to simulate the measured groundwater levels; however, this resulted in significantly higher groundwater extraction or loss rates to achieve the decline from the high groundwater level periods in the 1990s, 2005 and 2011 to the corresponding low groundwater levels in 2004, 2010, and 2016. Because of the water budget issue, the model calibration used the Primary Calibration; however, the Alternative Calibration indicates a potentially significant data gap in understanding the effects of mining operations on groundwater levels.

Figures 34 and 35 show hydrographs for six wells located within in the Mayhew area of the Coldwater MA which is located south of the wells shown in **Figure 33**. A similar pattern of groundwater level change is shown in these areas; however, the mining operations in these areas are more typically above the groundwater table such that the difference between the Primary and Alternative Calibration is less significant than for the wells in **Figure 33**. These wells show relatively strong agreement between measured and simulated groundwater levels over the simulation period.

Figure 36 shows hydrographs for four wells located north of the Coldwater MA and north of the wells shown in **Figure 33**. The pattern in the change in groundwater levels shows a similar pattern but the magnitude of the changes is much less. These wells are located further away from the mining areas which suggests much of these changes are related to mining operations. The Primary and Alternative Calibrations show a general match to the pattern and magnitude of the groundwater level changes over the simulation period, but show some offset in simulating the groundwater elevation.

5.4. EVALUATION OF GROUNDWATER FLOW

The Bedford-Coldwater Model simulates monthly groundwater elevations for 348 months from October 1989 through September 2018. In general, the overall groundwater flow directions remain generally consistent over this time with some variations observed near the major groundwater pumping centers. To evaluate the range of groundwater elevations, we have selected a few key time periods. These include:

- **Figure 37** - End of Historical Simulation Period – September 2018
- **Figure 38** - Period of consistently high groundwater levels – March 1995
- **Figure 39** - Period of consistently low groundwater levels – October 2010

The high and low conditions represent a combination of climatic conditions and groundwater pumping demands. Groundwater maps for Layers 1 for each of the above time periods is presented. In general, groundwater levels in Layers 1, 2 and 3 are generally consistent. For the purposes of evaluating groundwater flow directions, we have selected Layer 1 as representative of these three layers.

Figure 37 shows the groundwater level contours and flow directions for Layer 1 at the end of the historical simulation period representing September 2018 conditions. On each of these maps, large blue arrows to better illustrate the groundwater flow directions. The groundwater contour represents a line of equal groundwater elevation, or equipotential. Groundwater flow occurs at right angles to the contour lines with the direction flow from the higher to lower groundwater elevation. In general, groundwater flow in the Bedford MA is generally towards or along Temescal Wash. Along the Glen Ivy Fault groundwater flow directions are generally parallel to the fault in the southern area, but flow is away from the fault in the northern areas of the Bedford MA.

In the Coldwater MA, groundwater flow is generally from the marginal areas towards the primary pumping wells located within the area of the large gravel mining operations (**Figure 37**). The thinner aquifer along the basin margins has limited capacity to store the recharge that occurs along the basin margins from runoff, stream recharge and bedrock inflows. This, along with the higher elevations, creates higher groundwater elevations along the margins that drives groundwater flow into the center of the basin.

The tightly-spaced contours along the Glen Ivy Fault (**Figure 37**) that separates the Bedford and Coldwater MA represent the flow restriction formed by the faults that limits inflows into the deep basin and maintains higher, relatively stable groundwater levels upgradient of the faults. Within the deep basin, the groundwater levels are several hundred feet lower than on the areas upgradient faults.

Figures 38 show the groundwater elevations during March 1995. During this period, widespread high groundwater levels were observed reflecting a period of high precipitation and below average groundwater pumping rates occurring in the basin. Even in this case, the general groundwater flow directions remain generally consistent with September 2018 (**Figure 37**). The main differences are increased groundwater levels in the Coldwater MA and northern Bedford MA reflect increased recharge from creek reaching this area along with lower pumping. Steeper groundwater levels are observed along the basin margins reflecting the higher recharge rates due to the high precipitation levels.

Figure 39 shows the groundwater elevations during October 2010. During this period, widespread low groundwater levels were observed reflecting several preceding dry years. In general the groundwater flow directions remain generally consistent with September 2018 (**Figures 37**). The main differences are lower groundwater levels in the Coldwater MA due to groundwater pumping with limited recharge. In the Bedford MA, groundwater levels are also generally lower across the area due to lower recharge. .

The groundwater flow is consistent with the hydrogeological conceptual model. These maps are included to demonstrate that the model provides reasonable simulation of groundwater elevation and flow direction even during the more extreme climatic periods during the base period. This further demonstrates that the model is well calibrated and can accurately simulate wet and dry weather periods.

5.5. MODEL-BASED HYDROLOGIC BUDGET

GSP regulations (§354.18(c)(2)(B)) indicate a need to identify an average hydrologic study period that cover as least 10 years that includes a range of hydrologic conditions (e.g. wet, normal, dry and critically dry) for purposes of the groundwater analyses in the basin-wide water budgets. In order to select a consistent study period, the Bedford-Coldwater GSA is using a 29-year base period covering Water Years (WY) 1990 through 2018. Water years used for the Bedford-Coldwater Model run from October through to the following September to capture the cause and effect relationship on groundwater levels of wintertime rain and subsequent summertime groundwater pumping. Additional analysis of the historical water budget is provided in Section 5 ("Water Budget") of the GSP.

The model-derived groundwater budget for the entire Basin is presented in **Table 7**. Over the entire simulation period, groundwater inflows average about 9,300 AFY. Surface recharge from precipitation and return flows accounts for about 24 percent of the total recharge and average about 2,200 acre-feet per year (AFY). Groundwater-surface water interactions represent about 50 percent of the total recharge and average about 4,600 AFY. Mountain front recharge represents inflows from bedrock units into the basin from the surrounding watersheds. This accounts for about 15 percent of the total recharge and average about 1,350 AFY. Recharge from wastewater recharge ponds accounts for about 7 percent or 650 AFY. Groundwater inflow from the adjacent Temescal and Elsinore Valley Basins account about 4 percent of the total recharge and average about 370 AFY. Net recharge from quarry operations accounts for about 1 percent of the total recharge and averages about 100 AFY.

Outflows from the entire Basin, **Table 7**, average about 11,323 AFY. Groundwater pumping is the primary groundwater outflow accounting for about 63 percent of the outflow and averages about 7,100 AFY over the entire historical period. Quarry operations in both the Bedford MA and Coldwater MA account for about 21 percent of the outflow and averages about 2,400 AFY. Evapotranspiration (ET) accounts for about 7 percent of the outflow and averages about 780 AFY. Groundwater outflow from the adjacent Temescal and Elsinore Valley Basins account about 2 percent of the total recharge and average about 230 AFY.

Similar groundwater budget tables are presented for the each of the management areas defined within the Bedford-Coldwater GSA. These include:

- **Table 8** for the Bedford MA
- **Table 9** for the Coldwater MA

The difference between the model-derived inflows and outflows represents the change in groundwater in storage over the simulation period. **Table 10** summarizes the change in groundwater in storage for the entire Basin and for each of the individual subareas and are graphically illustrated on **Figure 40**. The overall change in storage over the simulation period for the entire Basin average a decline of about 2,000 AFY for a cumulative decline over the simulation period of about 59,000 AFY. OF this, the majority of the decline is experienced in the Coldwater MA where the majority of the groundwater pumping occurs. Most of the decline in groundwater in storage occurs prior 2002 when pumping rates were higher and quarry operations appear to be more active with respect to groundwater resources. Since 2008, EVWMD and the City of Corona have had an operating agreement for pumping within the Coldwater MA. As a results, the average change in groundwater in storage from 2005 through 2015 is an increase of 22 AFY for a cumulative increase of 240 acre-feet (**Table 10**).

6. SIMULATION OF FUTURE CONDITIONS

GSP regulations §354.18(c)(3) require simulation of several future scenarios to determine their effects on water balances, yield and sustainability indicators. The following scenarios to simulate future conditions include:

- **Baseline Scenario** - This represents a continuation of existing land and water use patterns, imported water availability, and climate.
- **Growth Plus Climate Change Scenario** - This scenario implements anticipated changes in land use and associated water use, such as urban expansion, and anticipated effects of future climate change on local hydrology (rainfall recharge and stream percolation) and on the availability of imported water supplies.

The historical period used for model calibration consisted of only 29 years (water years 1990-2018). The Sustainable Groundwater Management Act requires that future simulations cover a 50-year period. To obtain 50 years of hydrology, rainfall, reference ET and streamflow were assumed to repeat the 1993-2017 sequence twice. Rainfall during that period equaled 99 percent of the long-term average. Surface and subsurface inflows from tributary watersheds simulated using the rainfall-runoff-recharge model were also replicated to obtain 50 years of data. The initial conditions for the future baseline simulation equaled the ending water levels of the calibration simulation, or September 2018. Thus, the future simulation period nominally covers water years 2019 to 2068.

The future Baseline Scenario and Growth Plus Climate Change Scenario serve as a reference conditions against which to compare alternative management scenarios. Additional data and assumptions used in the future baseline simulation are described in Section 5 of the GSP ("Water Budget"). Inputs and results of other scenarios related to specific management actions recommended in the GSP are also described in Section 8 ("Management Actions").

6.1. BASELINE SCENARIO

The simulation is of a 50-year period, as required by SGMA regulations. For the simulations of future conditions, the hydrology is assumed to repeat the 1993 to 2017 calibration period twice to obtain 50 years of data. Specific assumptions and data included in the future baseline scenario are outlined below.

6.1.1. Baseline Assumptions

Municipal, commercial, and industrial (M&I) and private pumping were assumed to remain at existing levels. Initial estimates were obtained by calculating average pumping for each calendar month during 2010 through 2018 and applying those averages in every year of the future simulation. This approach omits additions to and withdrawals from Coldwater MA storage accounts by the three municipal agencies with wells in that MA. Municipal use of imported water was also assumed to remain at existing levels. From the standpoint of the groundwater budget, total municipal water use was used only to estimate pipe leaks. Use of imported water by the Temescal Valley Water District (TVWD) was obtained from that agency's 2015 Urban Water Management Plan (RMC/Woodard Curran 2017), and imported water use in the parts of the City of Corona (Corona) and Elsinore Valley Municipal Water District (EVMWD) service areas within the Basin were assumed to be the same on a per-acre basis for developed areas. Updated pumping volumes were input into the model with the MODFLOW well package.

Land use and water use were assumed to remain at their current patterns and levels throughout the 50-year period. Land use remains the same as actual, existing conditions. In the model these are represented by 2014 land use mapped by remote sensing methods and obtained from DWR, adjusted for subsequent urbanization identified in Google Earth imagery. These data were used in the rainfall-runoff-recharge model for estimated hydrologic parameters for MODFLOW model input.

Rainfall and reference evapotranspiration (ET_0) used historical monthly data for the 1993-2017 hydrologic period used in the model. The surface recharge was input using the MODFLOW recharge package and ET from groundwater rates are input using the MODFLOW EVT package.

Small stream inflows and bedrock inflow simulated for 1993 to 2017 of the calibration simulation were repeated twice to obtain 50 years of data Stream flows are entered in the MODFLOW model using the SFR2 package and the bedrock inflow is input using GHB package. Wastewater percolation and recycled water discharges to TVWD WRF recharge ponds and Temescal Wash were assumed to continue as under the current levels.

Initial water levels are simulated water levels for September 2018 from the historical calibration simulation. That year represents relatively recent, non-drought conditions. These simulated water levels are internally consistent throughout the model flow domain and reasonably matched measured water levels at wells with available data.

6.1.2. Baseline Water Budget Results

GSP regulations (§354.18(c)(2)(B)) require a 50-year simulation period of average hydrologic conditions (e.g. wet, normal, dry and critically dry) for purposes of the analyses in the projected-future basin-wide water budgets. The Future Baseline Scenario generally assumes a continuous of current groundwater operations and historical hydrology over the 50-year simulation period. Additional analysis of the historical water budget is provided in Section 5 ("Water Budget") of the GSP.

The model-derived groundwater budget for the entire Basin is presented in **Table 11**. Over the entire simulation period, groundwater inflows average about 10,100 AFY. Surface recharge from precipitation and return flows accounts for about 23 percent of the total recharge and average about 2,300 acre-feet per year (AFY). Groundwater-surface water interactions represent about 44 percent of the total recharge and average about 4,500 AFY. Groundwater-surface water interactions primarily account for recharge from streams, including wastewater and recycled water discharge to streams. Mountain front recharge represents inflows from bedrock units into the basin from the surrounding watersheds. This accounts for about 12 percent of the total recharge and average about 1,250 AFY. Recharge from wastewater recharge ponds accounts for about 19 percent or 1,850 AFY. Net recharge from quarry operations accounts for about 2 percent of the total recharge and averages about 160 AFY. Groundwater inflow from the adjacent Temescal and Elsinore Valley Basins account about 1 percent of the total recharge and average about 80 AFY.

Outflows from the entire Basin, **Table 11**, average about 9,200 AFY. Groundwater pumping is the primary groundwater outflow accounting for about 47 percent of the outflow and averages about 4,400 AFY over the entire historical period. Quarry operations in both Bedford and Coldwater MA account for about 26 percent of the outflow and averages about 2,400 AFY. Groundwater-surface water interactions represent about 11 percent of the total outflows and average about 1,000 AFY. ET accounts for about 10 percent of the outflow and averages about 900 AFY. Groundwater outflow from the adjacent Temescal and Elsinore Valley Basins account about 6 percent of the total recharge and average about 530 AFY.

Similar groundwater budget tables are presented for the each of the management areas defined within the Bedford-Coldwater GSA. These include:

- **Table 12** for the Bedford MA
- **Table 13** for the Coldwater MA

The difference between the model-derived inflows and outflows represents the change in groundwater in storage over the simulation period. **Table 14** summarizes the change in groundwater in storage for the entire Basin and for each of the individual subareas and are graphically illustrated on **Figure 51**. The overall change in storage over the simulation period for the entire Basin average is an increase of about 850 AFY for a cumulative increase over the 50-year simulation period of about 43,000 AFY. Of this, the majority of the increase is experienced in the Coldwater MA where the most significant changes to groundwater pumping occurs. The rate of the change in groundwater in storage increases from 140 AFY during the implementation period of the GSP (2018-2041). During the sustainability period of the GSP (2042-2068) the rate of the change in groundwater in storage increases from 830 AFY (**Table 14**).

6.1.3. Baseline Groundwater Flow Evaluation

A contour map of simulated groundwater elevations from the Baseline Scenario at the end of the simulation period (September 2068) is presented in **Figure 42**. In the Bedford MA, groundwater conditions remain generally consistent with September 2018 (**Figures 37**) with hydraulic gradients generally directed towards or along Temescal Wash. Only minor variations in groundwater levels are observed in the Bedford MA primarily related to shifts in groundwater pumping. This is consistent with the historical data which shows the Bedford MA with minimal change in groundwater in storage over time.

In the Coldwater MA, groundwater levels are generally about 100 feet or more higher in the center of the Coldwater MA. This is primarily due to the use of lower pumping rates in the Baseline that are consistent with present day pumping practices. The City of Corona and Elsinore Valley Municipal Water District established a production agreement in 2008 to ensure the sustainable use of groundwater in the Coldwater area (Corona and EVMWD, 2008). Prior to 2008, groundwater pumping in the Coldwater MA was much higher. Therefore, the Baseline Scenario results indicated that continued application of the 2008 agreement are anticipated to result in significant increases in groundwater levels over the 50-year simulation period.

6.2. GROWTH AND CLIMATE CHANGE SCENARIO

The growth plus climate change scenario incorporated anticipated effects of climate change, urban development and associated changes in water and wastewater management. The input parameters for the growth plus climate change scenario were input using the same MODFLOW packages as listed in the Baseline Scenario setup. Specific assumptions and data included in the growth plus climate change scenario are outlined below.

6.2.1. Growth and Climate Change Assumptions

For the growth plus climate change scenario, average annual groundwater pumping in the Coldwater MA was assumed to equal average historical pumping during 2010 through 2017, with an increase proportional to the estimated amount of irrigation return flow from future increased use of imported water. In the Bedford MA average annual groundwater pumping was assumed to be equal to 2020 production volumes. Municipal pumping in Coldwater was distributed among wells in proportion to their averages during 2010 to 2017 and in Bedford it was distributed as recorded in 2020. All remaining municipal water use was assumed to be obtained from imported water. Projected water use for irrigated turf in the rainfall-runoff-recharge model indicated that the combined effect of the warmer and drier climate will be to increase annual irrigation demand by about 10 percent.

A map of the zones and their land uses projected for 2068 is shown in **Figure 42.** The categories are listed in **Table 1** (**Section 3.2**) along with their total acreages in the groundwater basin management areas and tributary watersheds. Projected land use in 2068 was developed on the basis of population projections, land use designations in the Temescal Canyon Area Plan (Riverside County 2018), assumed urban infill, and topography. A comparison of land use acreage by land use category and management area for 1990, 2018, and 2068 was developed. Conversion of grassland to residential land use was the dominant change in both management areas and also occurred in tributary watershed areas.

Rainfall and reference evapotranspiration (ETo) were adjusted to 2070 conditions using monthly multipliers developed by DWR based on climate modeling studies. The climate in 2070 is expected to be drier and warmer than it presently is. The multipliers were applied to historical monthly data for the 1993-2017 hydrologic period used in the model. DWR prepared a unique set of multipliers for each 4-km^2 cell of a grid covering the entire state. Fourteen grid cells overlie the Basin and its tributary watershed areas. For each recharge analysis polygon in the rainfall-runoff-recharge model, multipliers from the nearest grid cell were used.

Bedrock inflow and surface inflow from tributary streams along the perimeter of the Basin were re-simulated using the rainfall-runoff-recharge model to reflect the effects of urban development in some of the tributary watersheds and of climate change. Urbanization also increased surface runoff within the Basin, which was routed to small streams and Temescal Wash.

Wastewater generation was assumed to double by 2068, in proportion to the increase in total urban water use. Wastewater disposal was assumed to change, however. In recent years more of the outflow from the TVWD WRF has been percolated in ponds than has been recycled for irrigation. This proportion was assumed to reverse, such that all outflow would be recycled for irrigation during April through November and all would be percolated in ponds during November through March. The small discharge from Corona WRF-3 to Temescal Wash at the northern end of the Basin was assumed to be eliminated, consistent with the City of Corona's plans to decommission that WRF.

Water pipe leak rates in the EVMWD and City of Corona service areas were assumed to decrease to 5 percent of delivered water from the rates reported in the 2015 Urban Water Management Plans (7.0 percent and 6.6 percent, respectively). The leak rate in the TVWD service area was assumed to continue at the low rate reported in 2015 (two percent).

In the growth plus climate change scenario, gravel mining operations were assumed to have ended and the mine areas to have been converted to stormwater control facilities with groundwater recharge capacity during high runoff periods.

6.2.2. Growth and Climate Change Scenario Water Budget Results

GSP regulations (§354.18(c)(2)(B)) require a 50-year simulation period of average hydrologic conditions (e.g. wet, normal, dry and critically dry) for purposes of the analyses in the projected-future basin-wide water budgets. The Growth with Climate Change Scenario includes planned changes in the groundwater operations in the basin along with projected climate change based on data provided by DWR. Additional analysis of the historical water budget is provided in Section 5 ("Water Budget") of the GSP.

The model-derived groundwater budget for the entire Basin is presented in **Table 15**. Over the entire simulation period, groundwater inflows average about 11,400 AFY. Surface recharge from precipitation and return flows accounts for about 26 percent of the total recharge and average about 2,900 acre-feet per year (AFY). Groundwater-surface water interactions represent about 39 percent of the total recharge and average about 4,500 AFY. Net recharge from quarry operations accounts for about 4 percent of the total recharge and averages about 470 AFY. Groundwater-surface water interactions primarily account for recharge from streams, including wastewater and recycled water discharge to streams. Mountain front recharge represents inflows from bedrock units into the basin from the surrounding watersheds. This accounts for about 11 percent of the total recharge and average about 1,250 AFY. Recharge from wastewater recharge ponds accounts for about 19 percent or 2,200 AFY. Groundwater inflow from the adjacent Temescal and Elsinore Valley Basins account about 1 percent of the total recharge and average about 80 AFY.

Outflows from the entire Basin, **Table 15**, average about 10,600 AFY. Groundwater pumping is the primary groundwater outflow accounting for about 48 percent of the outflow and averages about 5,000 AFY over the entire historical period. Quarry operations in both Bedford and Coldwater MA account for about 23 percent of the outflow and averages about 2,500 AFY. Groundwater-surface water interactions represent about 13 percent of the total outflows and average about 1,400 AFY. ET accounts for about 11 percent of the outflow and averages about 1,200 AFY. Groundwater outflow from the adjacent Temescal and Elsinore Valley Basins account about 4 percent of the total recharge and average about 470 AFY.

Similar groundwater budget tables are presented for the each of the management areas defined within the Bedford-Coldwater GSA. These include:

- **Table 16** for the Bedford MA
- **Table 17** for the Coldwater MA

The difference between the model-derived inflows and outflows represents the change in groundwater in storage over the simulation period. **Table 18** summarizes the change in groundwater in storage for the entire Subbasin and for each of the individual subareas and are graphically illustrated on **Figure 52**. The overall change in storage over the simulation period for the entire Basin average is an increase of about 850 AFY for a cumulative increase over the 50-year simulation period of about 42,600 AFY. Of this, the majority of the increase is experienced in the Coldwater MA where the most significant changes to groundwater pumping occurs. The rate of the change in groundwater in storage increases from 150 AFY during the implementation period of the GSP (2018-2041). During the sustainability period of the GSP (2042-2068) the rate of the change in groundwater in storage increases from 800 AFY (**Table 18**).

6.2.3. Future Growth and Climate Change Groundwater Map

A contour map of simulated groundwater elevations from the Growth and Climate Change Scenario at the end of the simulation period (September 2068) is presented in **Figure 45**. In the Bedford MA, groundwater conditions remain generally consistent with September 2018 (**Figures 37**) with hydraulic gradients generally directed towards or along Temescal Wash. Only minor variations in groundwater levels are observed in the Bedford MA primarily related to shifts in groundwater pumping. Furthermore, the groundwater conditions remain generally consistent with September 2068 Baseline Scenario results (**Figures 42**). The Growth and Climate Change Scenario adds an additional 1,200 AFY in groundwater pumping; however, a similar increase in groundwater recharge, primarily from urban return flows, generally balances these results.

As with the Baseline Scenario, groundwater levels for the Growth and Climate Change Scenario are generally about 100 feet in the center of the Coldwater MA due to the use of lower pumping rates compared to the historical pumping. The City of Corona and Elsinore Valley Municipal Water District established a production agreement in 2008 to ensure the sustainable use of groundwater in the Coldwater area (Corona and EVMWD, 2008). Prior to 2008, groundwater pumping in the Coldwater MA was much higher. Therefore, the Growth and Climate Change Scenario results indicated that continued application of the 2008 agreement are anticipated to result in significant increases in groundwater levels over the 50-year simulation period.

7. SGMA REQUIREMENTS

As noted in the SGMA Modeling Best Management Practices (BMP) guidelines (DWR, 2016), the description of the model application should include detailed information on the model conceptualization, assumptions, data inputs, boundary conditions, calibration, sensitivity and uncertainty analysis, and there applicable modeling elements such as model limitations. A DWR requirement for using model results in future water budget reporting for Annual Reports is to report the model accuracy. The following information addresses these reporting requirements.

7.1. MODEL DATA GAPS

When evaluating model results, it is important to consider the strengths and limitations of the numerical model. The horizontal and vertical resolution used to construct the model dictates the range of scales that the model can evaluate. The Bedford-Coldwater Model is designed as a regional or basin-wide model to evaluate long-term, regional trends and the overall groundwater inflow and outflow to the basin. Within that scale, conditions are averaged. However, this model may not contain the site-specific details necessary to evaluate some localized conditions due to geologic complexity or unique localized effects. For these areas, a more localized model may be required if such a detailed analysis is necessary. The regional model can provide a broader regional context to support the development of these localized models.

The groundwater flow model is an appropriate tool for evaluating groundwater conditions at the basin and subarea scale over periods of months to decades. Given its reasonable calibration under a wide range of historical hydrologic and water management conditions, it should produce reliable results under a similar range of future conditions. However, some aspects of the model and some types of applications may be less reliable. Limitations in model accuracy and in types of applications include the following:

- Understanding of water use and groundwater interaction with deep mining operations that intersect the groundwater present a data gap that presented challenges during the calibration. These issues were most prominent in the Coldwater MA, but also influenced some localized areas around the TVWD WRF in the Bedford MA. The Alternative Calibration indicates that calibration is limited by uncertainty regarding the historical quarry operations. A better understanding of quarry operations could provide an improved understanding to help enhance future model calibration.
- As with any regional model, the model cannot simulate details of water levels and flow at spatial scales smaller than one model cell. It cannot, for example, simulate drawdown within a pumping well. It can only simulate the average effect of that pumping on the average water level of the cell in which the well is located.
- The monthly stress periods of the model preclude simulation of brief hydrologic stresses. For example, the model cannot simulate the effects of daily pumping cycles on water levels, or the amount of recharge associated with peak stream flow events.
- Surface and subsurface inflows from tributary watersheds around the perimeter of the basin remain uncertain. The new rainfall-runoff-recharge model simulates watershed hydrology explicitly but flows from the watersheds to the groundwater basin are small compared to

rainfall and ET. Accurate data for those variables within the watershed areas are not available, and a small error in rainfall or ET can result in a large error in simulated watershed outflow.

- Model calibration is better in some parts of the basin than others. For any future model application that focuses on a particular subarea, it would be prudent to evaluate the quality of model calibration for that area before conducting simulations of alternative conditions.

7.2. MODEL ACCURACY

A numerical model mathematically describes the conceptual model by solving the mass balance and motion equations that govern groundwater flow and chemical transport (Bear and Verruijt 1987). To solve these equations, an iterative method is used to solve the matrix equations. For these iterative techniques, the procedure is repeated until the convergence criteria are met. The convergence criteria may be groundwater elevation change, mass balance difference, or both. Convergence defines whether the model is mathematically stable and capable of producing reliable results.

For this model, the Newton (NWT) Solver Package was used (Niswonger *et al*, 2011). The convergence criteria for NWT included both a maximum change in groundwater elevation and a maximum mass balance differential for a cell. For this model, the convergence parameter for groundwater elevation was set at 0.001 feet and 50 cubic feet per day for mass balance differential. Convergence is evaluated at the grid cell level. If a single cell does not meet the requirement, then the solution procedure is repeated. The model was able to successfully converge using the set convergence parameters.

The primary method to check whether the model is numerically stable is to evaluate the differential in mass balance. Iterative techniques provide an approximate solution for the model; therefore, there is always a mass balance differential. This differential should be small, and typically a differential of less than 1.00 percent is considered as a good solution. The mass balance differential for Bedford-Coldwater Model is 0.03%. These values further indicate that numerical model that is accurately simulating the flow of groundwater in the Basin.

The model calibration and comparison of the hydrologic budget results demonstrate that the model is consistent with the conceptual model to produce these results. The calibration correlation coefficient of 0.905 demonstrates a strong comparison between measured and simulated groundwater elevations. Other statistical calibration parameters show that the scaled ratio of the parameter to the range of observed groundwater levels is about 10 percent. Based on these parameters, the accuracy of the Bedford-Coldwater Model is considered to range between 10 to 15 percent.

7.3. LIMITATIONS TO CALIBRATION

All inputs to a model are estimates that are subject to errors or uncertainty, but some are better known than others. Also, some have relatively pronounced effects on simulation results. For example, the amount of water pumped by municipal wells is metered and is considered highly accurate compared to most model inputs. Accordingly, the amount of municipal pumping was not adjusted during calibration.

Data gaps with the water use with quarry operations and the groundwater interactions with the deep mining operation pits presented a challenge for calibration. Variables were selected for adjustment during calibration based on their relative uncertainty, the sensitivity of results to that variable, and whether the variable might logically be connected to an observed pattern of residuals based on hydrologic processes.

The measured water levels that serve as the basis for calibration are themselves subject to uncertainty stemming from wellhead elevation errors, effects of recent pumping at the measured well, and wells that for unknown reasons have water levels inconsistent with water levels at nearby wells. Almost all of the wells used to monitor water levels are active water supply wells. If a well was pumping shortly before the water level is measured, the water level will be much lower (by feet to tens of feet) than if the well had been idle for a day or more. In some hydrographs, pumping-affected water levels stand out as obvious anomalies. A number of those points were removed from the calibration data set. In other cases, water levels fluctuate over a wide range seasonally and between measurements, and pumping effects could not be systematically identified and eliminated.

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TABLES

Table 2 - Annual Groundwater Pumping Volumes by Well (acre-feet per year)

Well_Name	HA	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Corona #04	Bedford	291	253	305	269	33	332	173	103	215	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Flager #02	Bedford	620	940	1,001	279	54	418	289	606	606	202	656	560	420	643	578	523	16	147	495	517	19	0	0	0	0	0	0	0	0	0	0
Flager #03	Bedford	679	614	392	432	117	337	61	111	287	1	1	141	533	705	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Flagler #02A	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	289	420	444	36	0	0	37	207
Flagler #03A	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	475	458	699	16	0	0	42	202
Foster	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	220	275	169	185
New Sump	Bedford	501	479	570	379	57	128	185	328	429	45	336	575	439	435	239	342	33	2	241	358	295	388	57	12	198	200	13	288	680	414	278
Non Potable #01	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	245	0	0	0	0	0	0	258	28	1	1	1	450	368	185	243	380
Non Potable #02	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	177	131	151	253	268	327	0	0	1	1	1	0	0	0	0	0
Old Ranch	Bedford	0	1	19	18	248	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Old Sand Plant	Bedford	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rose #02	Bedford	84	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rose #03	Bedford	56	16	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rose #04	Bedford	153	52	7	168	238	206	8	18	0	0	31	30	4	12	6	1	4	3	3	3	1	1	1	1	1	1	440	295	476	385	410
Rose #09	Bedford	236	130	475	523	887	0	0	262	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TVWD 1	Bedford	172	51	166	183	230	34	207	0	0	0	31	30	4	29	6	1	4	3	3	3	1	1	1	1	1	1	442	163	445	354	425
TVWD TP1	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	324	205
TVWD TP2	Bedford	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	174	96
Coldwater City Park	Coldwater	110	160	680	1,020	1,300	260	1,300	19	16	16	17	1	1	15	17	17	18	17	0	0	0	0	0	0	0	0	0	0	0	0	0
Corona #01	Coldwater	1,278	1,062	1,001	1,174	1,663	1,285	1,685	1,680	1,629	1,614	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corona #02	Coldwater	157	0	0	394	1,152	1,059	1,191	1,256	1,016	1,067	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corona #03	Coldwater	1,155	1,024	1,107	1,192	1,368	1,072	1,391	1,297	1,349	1,110	770	506	4	1	237	380	978	1,316	1,083	999	897	952	491	559	83	392	881	460	3	0	0
Corona #20	Coldwater	0	0	0	0	0	0	0	0	0	0	1,489	0	0	0	0	0	338	801	430	361	186	238	186	57	212	196	19	0	0	0	0
Corona #21	Coldwater	0	0	0	0	0	0	0	0	0	2,461	4,364	3,493	2,528	2,579	2,345	2,401	1,506	1,609	2,004	1,955	2,018	1,942	761	662	1,432	1,658	1,254	1,508	764	178	0
Div Box Well	Coldwater	0	0	0	0	388	419	563	468	125	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mayhew #01	Coldwater	921	662	678	212	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mayhew #02	Coldwater		0	0	235	853	1,108	356	727	436	649	737	587	462	318	348	219	596	493	377	432	383	413	457	436	467	747	400	286	575	174	748
Noble #1 Maitri Rd	Coldwater	147	135	112	90	75	69	65	81	95	101	170	37	139	172	207	348	16	23	0	0	507	477	497	547	558	547	535	556	586	565	522
SantaAna #1 UpperCyn	Coldwater	81	44	80	88	86	100	111	113	5	83	110	12	45	0	0	0	0	0	0	0	0	0	27	102	41	26	44	34	66	45	45
SantaAna #2 LowerCyn	Coldwater	9	9	11	12	18	18	9	14	3	30	22	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	2	8	9	8
Smith #2	Coldwater	32	32	32	32	32	32	38	40	41	37	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smith Lower #1	Coldwater	35	35	35	35	35	35	33	35	30	27	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Smith Upper #2	Coldwater	5	5	5	5	5	5	3	3	2	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Station #26	Coldwater	164	165	116	89	14	3	30	109	77	20	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Station #71	Coldwater	632	476	306	500	858	577	881	930	1,226	690	318	551	378	399	241	185	30	139	216	131	120	100	0	111	238	388	24	97	92	0	175
Station #72	Coldwater	344	302	303	332	369	345	322	288	200	126	337	456	422	353	276	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Warm Sprg	Coldwater	73	73	73	73	73	62	72	73	73	72	67	72	75	72	71	73	72	71	72	72	68	0	0	0	0	0	0	54	57	56	57
Well #1	Coldwater	83	89	71	57	37	26	31	40	47	53	62	8	3	2	2	11	555	620	608	569	0	0	0	0	0	0	0	0	0	0	0
Subtotals																																
Bedford	Bedford	2,792	2,570	2,935	2,251	1,864	1,455	923	1,428	1,537	248	1,055	1,336	1,400	1,824	1,078	1,046	188	306	995	1,149	643	648	87	780	1,080	1,347	1,397	1,334	2,061	2,142	2,389
Coldwater	Coldwater	5,226	4,273	4,610	5,540	8,326	6,475	8,081	7,173	6,370	8,284	8,550	5,723	4,057	3,911	3,744	3,634	4,110	5,089	4,791	4,520	4,179	4,122	2,419	2,475	3,032	3,955	3,157	2,998	2,152	1,027	1,555
Total		8,018	6,843	7,545	7,791	10,190	7,930	9,004	8,601	7,907	8,532	9,605	7,059	5,457	5,735	4,822	4,680	4,298	5,395	5,786	5,669	4,822	4,770	2,506	3,255	4,112	5,302	4,554	4,332	4,213	3,169	3,944

Table 3 - Aquifer Properties for MODFLOW Zones by Model Layer

Horizontal Hydraulic Conductivity (feet/day)					
Zone	**Name**	**MA**	**Model Layer 1**	**Model Layer 2**	**Model Layer 3**
1	Mayhew Area	Coldwater	5	2	1
2	Mid Wash	Bedford	100	10	1
3	Bedford Canyon	Bedford	5	2	1
4	Midlands South	Bedford	2	2	1
5	North Wash	Bedford	100	10	1
6	South Wash	Bedford	40	5	1
7	Coldwater Creek	Coldwater	10	2	1
8	North Area	Coldwater	2.5	2	1
9	Midlands North	Bedford	2	1	1
Vertical Hydraulic Conductivity (feet/day)					
Zone	**Name**	**MA**	**Model Layer 1**	**Model Layer 2**	**Model Layer 3**
1	Mayhew Area	Coldwater	1	0.2	0.5
2	Mid Wash	Bedford	5	5	0.5
3	Bedford Canyon	Bedford	2.5	0.2	0.1
4	Midlands South	Bedford	0.4	0.2	0.1
5	North Wash	Bedford	5	5	5.0E-01
6	South Wash	Bedford	4	0.5	5.0E-01
7	Coldwater Creek	Coldwater	1	0.2	0.5
8	North Area	Coldwater	0.25	0.2	5.0E-01
9	Midlands North	Bedford	0.4	0.1	1.0E-01
Specific Storage (1/feet)					
Zone	**Name**	**MA**	**Model Layer 1**	**Model Layer 2**	**Model Layer 3**
1	Mayhew Area	Coldwater	1.0E-04	2.0E-05	1.0E-05
2	Mid Wash	Bedford	2.0E-04	1.0E-04	1.0E-05
3	Bedford Canyon	Bedford	1.0E-04	2.0E-05	1.0E-05
4	Midlands South	Bedford	1.0E-04	2.0E-05	1.0E-05
5	North Wash	Bedford	5.0E-04	1.0E-04	1.0E-05
6	South Wash	Bedford	1.0E-03	1.0E-04	1.0E-05
7	Coldwater Creek	Coldwater	1.0E-03	2.0E-05	1.0E-05
8	North Area	Coldwater	2.0E-03	1.0E-05	1.0E-05
9	Midlands North	Bedford	1.0E-04	1.0E-05	1.0E-05
Specific Yield (percentage)					
Zone	**Name**	**MA**	**Model Layer 1**	**Model Layer 2**	**Model Layer 3**
1	Mayhew Area	Coldwater	0.05	0.03	0.02
2	Mid Wash	Bedford	0.15	0.1	0.02
3	Bedford Canyon	Bedford	0.05	0.03	0.02
4	Midlands South	Bedford	0.05	0.03	0.02
5	North Wash	Bedford	0.15	0.1	0.02
6	South Wash	Bedford	0.11	0.1	0.02
7	Coldwater Creek	Coldwater	0.08	0.05	0.02
8	North Area	Coldwater	0.05	0.02	0.02
9	Midlands North	Bedford	0.05	0.01	0.02

Table 5 - Statistical Calibration by Well

Well ID	Model Layer	Count	Residual Mean (feet)	Absolute Residual Mean (feet)	Standard Deviation (feet)	Management Area
B_Well	1	106	47.7	47.7	12.8	Coldwater
Corona#01	1	152	31.8	43.2	38.6	Coldwater
Corona#02	1	108	48.7	59.0	42.6	Coldwater
Corona#03	1	378	15.8	35.5	40.4	Coldwater
Corona#04	1	183	-5.9	12.7	16.6	Bedford
Corona#20	1	181	-35.7	44.3	45.3	Coldwater
Corona#21	1	99	18.8	26.6	28.0	Coldwater
Div_Box_Well	1	71	46.8	46.8	21.4	Coldwater
Flager#02	1	276	5.9	6.4	4.6	Bedford
Flager#03	1	145	8.5	10.7	8.2	Bedford
Flagler#02A	1	133	0.4	4.9	7.6	Bedford
Flagler#03A	1	196	-3.3	5.2	7.4	Bedford
Flagler#04	1	90	5.3	6.9	5.8	Bedford
LLWD_#01-Old	1	11	-2.6	5.5	5.6	Bedford
Mayhew#01	1	261	36.4	52.8	52.7	Coldwater
Mayhew#02	1	15	43.0	64.4	65.1	Coldwater
New_Sump	1	352	0.9	9.8	13.4	Bedford
Non-Potable#01	1	64	-2.1	6.3	7.5	Bedford
Non-Potable#02	1	62	-3.8	7.3	10.1	Bedford
OLD_SUMP	1	1	3.6	3.6	NA	Bedford
Station#22	1	58	58.0	58.7	38.2	Coldwater
Station#26	1	154	92.7	93.0	28.6	Coldwater
Station#71	1	309	4.9	40.2	50.5	Coldwater
Station#72	1	214	46.6	55.0	44.3	Coldwater
Trilogy	1	95	-7.3	32.8	35.1	Coldwater
TVWD#01A	1	11	-1.1	4.5	5.2	Bedford
TVWD#04	1	11	-3.0	5.0	4.8	Bedford
Basin Average		**3736**	**16.02**	**31.6**	**42.49**	
Bedford Average		**1535**	**0.21**	**6.83**	**8.05**	
Coldwater Average		**2201**	**32.02**	**50.00**	**38.84**	

Table 7 - Bedford/Coldwater GW Basin Water Balance (in acre-feet per year) - Historical

	INFLOWS							OUTFLOWS							
Simulation Year	Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	WRF Perc Ponds	Boundary Inflow	Total Inflow	Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
1990	1,027	1,194	1,656	74	0	1,173	5,125	10,621	5,276	1,086	446	57	17,486	-12,361	-12,361
1991	1,954	6,303	1,660	7	0	1,218	11,142	10,130	2,014	747	445	59	13,395	-2,253	-14,614
1992	1,576	4,486	1,654	18	0	776	8,510	9,579	1,012	520	342	46	11,498	-2,988	-17,602
1993	7,001	19,899	1,641	418	0	206	29,167	11,724	1,214	1,588	1,090	370	15,986	13,181	-4,421
1994	961	1,366	1,645	314	0	399	4,684	11,391	1,006	1,011	537	117	14,062	-9,378	-13,799
1995	3,167	9,420	1,973	121	20	245	14,946	10,957	1,297	1,123	686	105	14,169	777	-13,022
1996	939	562	2,012	111	40	384	4,049	11,610	1,252	582	428	48	13,921	-9,871	-22,893
1997	1,007	345	1,721	11	62	685	3,831	10,893	1,112	234	267	33	12,539	-8,707	-31,601
1998	4,730	13,989	1,467	36	107	253	20,582	10,377	1,471	838	674	287	13,647	6,935	-24,666
1999	864	342	1,355	1	210	242	3,014	11,517	1,558	413	369	117	13,974	-10,960	-35,626
2000	1,154	527	1,047	14	309	415	3,466	9,543	2,383	117	501	33	12,577	-9,111	-44,737
2001	1,975	5,127	989	85	373	497	9,047	7,351	2,713	194	721	30	11,009	-1,962	-46,699
2002	734	73	1,161	56	473	928	3,425	6,803	2,751	94	740	24	10,412	-6,987	-53,686
2003	2,286	5,187	957	29	691	645	9,795	5,714	2,425	154	872	41	9,205	590	-53,096
2004	1,047	316	731	37	891	562	3,582	5,313	5,314	83	807	30	11,547	-7,965	-61,061
2005	9,460	23,787	1,390	1	1,029	124	35,791	5,075	2,336	2,387	1,654	631	12,083	23,708	-37,353
2006	1,872	3,870	1,855	38	854	87	8,577	5,978	1,989	2,174	977	783	11,901	-3,324	-40,676
2007	600	1,045	1,805	0	801	143	4,393	6,168	1,972	1,114	1,183	184	10,622	-6,229	-46,906
2008	582	695	1,680	0	525	313	3,795	5,829	3,525	666	813	44	10,877	-7,082	-53,988
2009	1,642	2,582	1,588	72	291	148	6,323	5,157	4,159	639	868	200	11,023	-4,700	-58,688
2010	3,801	8,513	1,214	14	285	80	13,906	4,919	3,743	953	1,226	541	11,382	2,524	-56,165
2011	4,804	10,308	1,241	30	0	75	16,459	3,162	1,875	1,584	1,256	869	8,746	7,713	-48,452
2012	1,086	1,174	1,452	18	487	94	4,310	3,124	1,689	1,187	759	355	7,114	-2,804	-51,256
2013	848	931	1,460	22	1,575	165	5,002	3,982	2,455	831	625	74	7,966	-2,964	-54,220
2014	1,108	792	1,429	25	1,646	399	5,399	5,090	2,438	568	564	49	8,708	-3,309	-57,529
2015	1,370	757	1,094	178	1,462	192	5,053	4,560	2,241	450	816	278	8,345	-3,292	-60,821
2016	1,083	565	463	252	386	92	2,841	4,244	1,232	257	306	324	6,362	-3,521	-64,342
2017	3,793	8,905	506	404	3,438	80	17,126	4,046	3,736	662	1,088	599	10,131	6,995	-57,348
2018	876	931	659	353	2,862	72	5,753	2,812	3,062	433	916	460	7,682	-1,929	-59,276
Average Water Budget over Simulation Period (1990-2018)															
Average	2,184	4,620	1,362	94	649	369	9,279	7,161	2,388	782	758	234	11,323	-2,044	
Total	63,346	133,989	39,506	2,740	18,818	10,696	269,094	207,669	69,249	22,689	21,977	6,787	328,370	-59,276	
Average Water Budget over Early Historical period (1993-2002)															
Average	2,253	5,165	1,501	117	159	426	9,621	10,217	1,676	619	601	116	13,230	-3,608	
Total	22,533	51,651	15,011	1,167	1,594	4,255	96,212	102,166	16,758	6,194	6,014	1,164	132,296	-36,084	
Average Water Budget over Late Historical period (2005-2015)															
Average	2,470	4,950	1,473	36	814	166	9,910	4,822	2,584	1,141	977	364	9,888	22	
Total	27,172	54,452	16,208	399	8,956	1,821	109,007	53,044	28,421	12,553	10,742	4,007	108,768	240	
Average Water Budget over Long Historical period (1993-2015)															
Average	2,306	4,852	1,431	71	527	317	9,504	7,228	2,301	825	802	228	11,383	-1,879	
Total	53,037	111,605	32,908	1,632	12,132	7,283	218,597	166,237	52,918	18,984	18,435	5,242	261,816	-43,220	
Average Water Budget over Current period (2008-2018)															
Average	1,908	3,287	1,162	124	1,178	156	7,815	4,266	2,741	748	840	345	8,940	-1,125	
Total	20,992	36,152	12,786	1,368	12,957	1,711	85,966	46,925	30,154	8,230	9,236	3,792	98,337	-12,371	

Table 8 - Bedford MA Water Balance (in acre-feet per year) - Historical

	INFLOWS							OUTFLOWS							
Simulation Year	Surface Recharge	GW-SW	Quarry Recharge	Mountain Front Recharge	WRF Perc Ponds	Boundary Inflow	Total Inflow	Wells	GW-SW	Quarry Outflow	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
1990	693	863	74	980	0	1,493	4,103	4,309	731	973	394	57	6,464	-2,361	-2,361
1991	1,270	2,248	7	981	0	1,514	6,020	4,056	559	1,153	369	59	6,196	-176	-2,537
1992	1,000	1,344	18	979	0	1,054	4,395	3,216	409	1,012	306	46	4,988	-593	-3,130
1993	4,800	3,920	418	977	0	423	10,538	3,230	1,495	1,214	768	370	7,076	3,462	332
1994	644	1,042	314	978	0	637	3,614	2,939	950	1,006	531	117	5,544	-1,930	-1,598
1995	2,085	2,422	121	1,185	20	427	6,260	2,349	1,080	1,297	609	105	5,441	819	-779
1996	654	494	111	1,194	40	563	3,057	2,554	563	1,252	427	48	4,845	-1,787	-2,566
1997	733	206	11	1,046	62	849	2,907	2,607	233	1,112	267	33	4,252	-1,345	-3,911
1998	3,219	3,159	36	897	107	354	7,772	1,462	832	1,471	545	287	4,597	3,174	-736
1999	647	341	1	833	210	342	2,375	1,861	413	1,558	369	117	4,318	-1,944	-2,680
2000	785	146	14	629	309	499	2,381	2,086	117	1,373	195	33	3,804	-1,423	-4,103
2001	1,274	1,731	85	592	373	556	4,611	2,040	193	1,108	294	30	3,664	947	-3,155
2002	475	72	56	693	473	977	2,746	2,212	94	1,145	268	24	3,743	-998	-4,153
2003	1,401	1,655	29	547	691	654	4,978	1,641	152	1,447	341	41	3,622	1,356	-2,796
2004	707	153	37	393	891	562	2,743	1,440	83	1,490	311	20	3,344	-601	-3,398
2005	6,337	4,947	1	848	1,029	124	13,287	902	2,377	2,279	1,037	553	7,149	6,138	2,740
2006	1,232	2,135	38	1,119	854	87	5,466	954	2,170	1,982	773	743	6,622	-1,157	1,584
2007	411	1,031	0	1,080	801	143	3,466	1,167	1,114	1,972	497	166	4,917	-1,451	133
2008	397	682	0	1,019	525	313	2,936	1,136	666	1,542	350	20	3,714	-778	-646
2009	1,023	1,205	72	969	291	148	3,707	795	637	1,290	418	150	3,291	416	-230
2010	2,511	2,888	14	706	285	80	6,483	669	949	1,654	626	457	4,355	2,128	1,898
2011	3,209	3,069	30	765	0	75	7,148	235	1,580	1,583	919	762	5,080	2,069	3,967
2012	768	1,172	18	894	487	94	3,434	632	1,187	1,689	759	270	4,537	-1,103	2,864
2013	604	931	22	897	1,575	165	4,194	1,032	831	2,455	625	-11	4,932	-738	2,126
2014	762	664	25	894	1,646	399	4,390	1,308	568	2,438	564	-46	4,831	-440	1,686
2015	954	577	178	686	1,462	192	4,049	1,202	450	2,241	429	171	4,493	-444	1,242
2016	744	403	252	297	386	92	2,174	1,191	257	1,232	292	207	3,178	-1,005	237
2017	2,521	2,847	404	341	3,438	80	9,631	1,625	660	3,736	585	463	7,069	2,562	2,800
2018	584	727	353	382	2,862	72	4,980	1,444	433	3,062	359	357	5,655	-675	2,125
Average Water Budget over Simulation Period (1990-2018)															
Average	1,464	1,485	94	821	649	447	4,960	1,803	751	1,647	491	195	4,887	73	
Total	42,446	43,072	2,740	23,800	18,818	12,970	143,845	52,295	21,784	47,766	14,227	5,649	141,721	2,125	
Average Water Budget over Early Historical period (1993-2002)															
Average	1,532	1,353	117	902	159	563	4,626	2,334	597	1,254	427	116	4,728	-102	
Total	15,317	13,532	1,167	9,022	1,594	5,627	46,261	23,341	5,970	12,537	4,272	1,164	47,284	-1,023	
Average Water Budget over Late Historical period (2005-2015)															
Average	1,655	1,755	36	898	814	166	5,324	912	1,139	1,920	636	294	4,902	422	
Total	18,208	19,300	399	9,877	8,956	1,821	58,560	10,033	12,529	21,124	6,999	3,235	53,920	4,640	
Average Water Budget over Long Historical period (1993-2015)															
Average	1,549	1,506	71	863	527	377	4,893	1,585	815	1,591	518	194	4,703	190	
Total	35,633	34,641	1,632	19,840	12,132	8,664	112,542	36,455	18,735	36,599	11,922	4,459	108,170	4,372	
Average Water Budget over Current period (2008-2018)															
Average	1,280	1,379	124	714	1,178	156	4,830	1,024	747	2,084	539	255	4,649	181	
Total	14,077	15,164	1,368	7,849	12,957	1,711	53,127	11,269	8,219	22,920	5,926	2,800	51,135	1,992	

Table 9 - Coldwater MA Water Balance (in acre-feet per year) - Historical

Simulation Year	INFLOWS Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	Boundary Inflow	Total Inflow	OUTFLOWS Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
1990	334	331	676	0	0	1,341	6,312	4,303	355	52	320	11,342	-10,000	-10,000
1991	684	4,055	678	0	0	5,418	6,074	861	188	76	296	7,495	-2,077	-12,077
1992	576	3,141	675	0	0	4,393	6,363	0	111	37	277	6,787	-2,395	-14,472
1993	2,201	15,979	665	0	0	18,845	8,493	0	93	323	217	9,126	9,719	-4,753
1994	317	324	667	0	0	1,308	8,451	0	61	6	238	8,756	-7,448	-12,201
1995	1,082	6,998	788	0	0	8,868	8,608	0	43	77	182	8,909	-42	-12,243
1996	285	68	818	0	0	1,171	9,056	0	19	2	179	9,255	-8,084	-20,327
1997	274	139	675	0	0	1,088	8,285	0	1	1	164	8,451	-7,363	-27,690
1998	1,511	10,831	570	0	0	12,912	8,915	0	5	129	101	9,151	3,761	-23,929
1999	217	1	522	0	0	740	9,656	0	0	0	100	9,756	-9,017	-32,946
2000	369	381	419	0	0	1,169	7,457	1,010	0	306	84	8,857	-7,688	-40,634
2001	702	3,396	397	0	0	4,494	5,312	1,605	2	427	59	7,404	-2,909	-43,544
2002	259	1	468	0	0	728	4,591	1,606	0	472	49	6,718	-5,990	-49,533
2003	884	3,532	410	0	0	4,826	4,073	977	2	531	9	5,592	-766	-50,300
2004	340	163	338	0	10	850	3,873	3,824	0	496	0	8,193	-7,344	-57,643
2005	3,122	18,840	542	0	77	22,582	4,173	57	10	617	0	4,857	17,724	-39,919
2006	641	1,735	736	0	40	3,152	5,024	7	4	204	0	5,238	-2,087	-42,005
2007	189	14	725	0	18	945	5,001	0	0	685	0	5,687	-4,741	-46,747
2008	185	13	661	0	24	883	4,693	1,983	0	463	0	7,139	-6,256	-53,002
2009	619	1,377	619	0	51	2,667	4,361	2,869	2	450	0	7,681	-5,015	-58,017
2010	1,290	5,625	508	0	83	7,506	4,250	2,089	4	601	0	6,943	562	-57,455
2011	1,595	7,239	476	0	106	9,416	2,927	292	4	337	0	3,560	5,856	-51,598
2012	317	1	558	0	85	961	2,492	0	0	0	0	2,492	-1,531	-53,129
2013	244	1	562	0	85	892	2,950	0	0	0	0	2,950	-2,058	-55,187
2014	346	127	536	0	95	1,104	3,783	0	0	0	0	3,783	-2,679	-57,866
2015	416	180	408	0	107	1,111	3,358	0	0	387	0	3,745	-2,633	-60,499
2016	339	162	166	0	117	784	3,053	0	0	14	0	3,067	-2,282	-62,782
2017	1,272	6,058	165	0	136	7,631	2,421	0	2	503	0	2,926	4,705	-58,077
2018	292	205	277	0	123	896	1,368	0	0	557	0	1,924	-1,028	-59,105
Average Water Budget over Simulation Period (1990-2018)														
Average	721	3,135	542	0	40	4,437	5,358	741	31	267	78	6,475	-2,038	
Total	20,901	90,917	15,706	0	1,158	128,682	155,373	21,483	905	7,750	2,275	187,786	-59,105	
Average Water Budget over Early Historical period (1993-2002)														
Average	722	3,812	599	0	0	5,132	7,882	422	22	174	137	8,638	-3,506	
Total	7,216	38,118	5,989	0	0	51,323	78,824	4,221	224	1,742	1,372	86,384	-35,061	
Average Water Budget over Late Historical period (2005-2015)														
Average	815	3,196	576	0	70	4,656	3,910	663	2	340	0	4,916	-260	
Total	8,964	35,152	6,331	0	772	51,219	43,011	7,297	24	3,743	0	54,075	-2,856	
Average Water Budget over Long Historical period (1993-2015)														
Average	757	3,346	568	0	34	4,705	5,643	710	11	283	60	6,706	-2,001	
Total	17,404	76,965	13,068	0	782	108,218	129,782	16,319	250	6,513	1,381	154,245	-46,027	
Average Water Budget over Current period (2008-2018)														
Average	629	1,908	449	0	92	3,077	3,241	658	1	301	0	4,201	-1,123	
Total	6,915	20,988	4,937	0	1,012	33,852	35,655	7,233	11	3,310	0	46,210	-12,358	

Table 10 - Change in Groundwater in Storage (in acre-feet per year) - Historical

Simulation Year	Net Change in Groundwater in Storage		Annual Change in Groundwater in Storage	Cumulative Storage Change
	Coldwater Hydrologic Area	Bedford Hydrologic Area		
1990	-10,000	-2,361	-12,361	-12,361
1991	-2,077	-176	-2,253	-14,614
1992	-2,395	-593	-2,988	-17,602
1993	9,719	3,462	13,181	-4,421
1994	-7,448	-1,930	-9,378	-13,799
1995	-42	819	777	-13,022
1996	-8,084	-1,787	-9,871	-22,893
1997	-7,363	-1,345	-8,707	-31,601
1998	3,761	3,174	6,935	-24,666
1999	-9,017	-1,944	-10,960	-35,626
2000	-7,688	-1,423	-9,111	-44,737
2001	-2,909	947	-1,962	-46,699
2002	-5,990	-998	-6,987	-53,686
2003	-766	1,356	590	-53,096
2004	-7,344	-622	-7,965	-61,062
2005	17,724	5,984	23,708	-37,354
2006	-2,087	-1,237	-3,324	-40,677
2007	-4,741	-1,488	-6,229	-46,906
2008	-6,256	-826	-7,082	-53,989
2009	-5,015	314	-4,700	-58,689
2010	562	1,961	2,524	-56,165
2011	5,856	1,856	7,713	-48,453
2012	-1,531	-1,273	-2,804	-51,257
2013	-2,058	-907	-2,964	-54,221
2014	-2,679	-630	-3,309	-57,530
2015	-2,633	-659	-3,292	-60,822
2016	-2,282	-1,243	-3,526	-64,348
2017	4,705	2,287	6,992	-57,356
2018	-1,028	-881	-1,909	-59,264
Average Water Budget over Simulation Period (1990-2018)				
Average	-2,038	-6	-2,044	
Total	-59,105	-160	-59,264	
Average Water Budget over Early Historical period (1993-2002)				
Average	-3,506	-102	-3,608	
Total	-35,061	-1,023	-36,084	
Average Water Budget over Late Historical period (2005-2015)				
Average	-260	281	22	
Total	-2,856	3,096	239	
Average Water Budget over Long Historical period (1993-2015)				
Average	-2,001	122	-1,879	
Total	-46,027	2,807	-43,220	
Average Water Budget over Current period (2008-2018)				
Average	-1,123	0	-1,123	
Total	-12,358	0	-12,358	

Table 11 - Bedford/Coldwater GW Basin Water Balance (in acre-feet per year) - Projected Future Baseline Scenario

Simulation Year	INFLOWS Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	WRF Perc Ponds	Boundary Inflow	Total Inflow	OUTFLOWS Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	7,126	16,193	1,580	107	1,856	71	26,933	4,319	2,911	1,486	1,278	660	10,654	16,279	16,279
2020	1,173	1,667	1,581	151	1,856	88	6,515	4,330	2,546	1,285	975	602	9,736	-3,221	13,058
2021	3,514	7,565	1,578	128	1,856	83	14,723	4,318	2,647	1,410	1,142	662	10,179	4,544	17,602
2022	905	1,120	1,587	173	1,856	91	5,732	4,333	2,358	1,008	923	524	9,146	-3,414	14,188
2023	1,089	1,008	1,592	185	1,856	91	5,822	4,330	2,220	795	850	451	8,646	-2,824	11,364
2024	4,977	10,445	1,436	118	1,856	77	18,908	4,326	2,652	1,357	1,159	669	10,163	8,744	20,108
2025	852	1,005	1,335	167	1,856	91	5,306	4,333	2,392	957	906	539	9,128	-3,822	16,287
2026	1,189	1,122	1,040	184	1,856	90	5,480	4,326	2,225	632	739	430	8,351	-2,871	13,416
2027	2,199	5,764	979	159	1,856	84	11,040	4,321	2,383	807	782	519	8,812	2,228	15,644
2028	526	652	1,097	194	1,856	92	4,417	4,335	2,179	580	656	409	8,158	-3,742	11,902
2029	2,586	5,375	887	159	1,856	84	10,947	4,315	2,293	615	764	492	8,479	2,468	14,370
2030	923	760	678	194	1,856	88	4,500	4,329	2,152	429	618	386	7,915	-3,415	10,955
2031	9,183	19,552	1,292	82	1,856	63	32,029	4,316	2,934	2,000	1,620	760	11,630	20,399	31,354
2032	1,672	2,232	1,673	136	1,856	83	7,652	4,324	2,667	1,633	1,152	701	10,476	-2,824	28,530
2033	457	1,082	1,612	183	1,856	91	5,281	4,332	2,320	1,051	847	474	9,023	-3,743	24,787
2034	473	934	1,498	194	1,856	91	5,047	4,321	2,161	865	665	389	8,402	-3,355	21,432
2035	1,529	2,031	1,426	182	1,856	84	7,108	4,324	2,183	774	709	424	8,413	-1,305	20,126
2036	3,554	8,626	1,055	133	1,856	80	15,304	4,324	2,577	1,055	966	614	9,535	5,768	25,895
2037	4,546	10,266	1,117	110	1,856	79	17,975	4,319	2,767	1,460	1,206	718	10,470	7,505	33,400
2038	985	1,013	1,313	168	1,856	91	5,426	4,326	2,400	963	922	529	9,139	-3,713	29,687
2039	726	780	1,322	189	1,856	91	4,965	4,334	2,207	718	755	423	8,436	-3,472	26,215
2040	973	652	1,296	199	1,856	92	5,066	4,332	2,094	507	698	374	8,005	-2,938	23,277
2041	1,240	549	980	195	1,856	92	4,911	4,331	2,065	372	614	359	7,740	-2,829	20,448
2042	920	477	405	205	1,856	92	3,955	4,329	2,015	244	543	331	7,461	-3,507	16,942
2043	3,490	8,003	461	152	1,856	80	14,042	4,327	2,363	560	773	510	8,533	5,509	22,450
2044	7,064	15,871	1,102	99	1,856	71	26,063	4,328	2,855	1,696	1,396	739	11,014	15,050	37,500
2045	1,172	1,713	1,539	150	1,856	87	6,518	4,330	2,578	1,354	1,005	613	9,880	-3,362	34,138
2046	3,514	7,700	1,843	126	1,856	83	15,122	4,318	2,669	1,546	1,195	675	10,403	4,719	38,856
2047	901	1,306	2,055	167	1,856	91	6,377	4,349	2,427	1,221	1,008	545	9,550	-3,173	35,683
2048	1,080	1,183	1,799	182	1,887	93	6,224	4,398	2,340	966	936	485	9,125	-2,902	32,781
2049	5,091	10,927	1,443	116	1,897	77	19,551	4,399	2,763	1,525	1,247	696	10,631	8,921	41,702
2050	819	1,088	1,339	169	1,897	93	5,405	4,406	2,481	1,048	953	557	9,445	-4,040	37,662
2051	1,187	1,346	1,043	184	1,897	92	5,748	4,400	2,314	722	781	450	8,667	-2,919	34,743
2052	2,200	6,108	982	156	1,887	85	11,418	4,388	2,475	894	830	564	9,152	2,266	37,009
2053	481	713	1,105	196	1,897	93	4,485	4,407	2,257	641	687	441	8,432	-3,948	33,061
2054	2,625	5,771	891	158	1,897	85	11,427	4,389	2,401	699	808	532	8,829	2,597	35,659
2055	910	944	678	193	1,897	90	4,712	4,403	2,245	510	657	421	8,236	-3,524	32,135
2056	9,323	20,087	1,301	78	1,887	65	32,740	4,383	3,030	2,213	1,713	797	12,136	20,604	52,739
2057	1,661	2,378	1,688	137	1,897	85	7,846	4,396	2,729	1,723	1,190	733	10,772	-2,926	49,813
2058	414	1,141	1,622	186	1,897	93	5,352	4,405	2,389	1,113	872	492	9,271	-3,920	45,893
2059	428	981	1,508	197	1,897	93	5,104	4,394	2,233	919	683	400	8,630	-3,526	42,367
2060	1,523	2,348	1,429	178	1,887	85	7,450	4,392	2,285	839	745	467	8,728	-1,278	41,090
2061	3,639	8,910	1,050	133	1,897	81	15,710	4,397	2,669	1,154	1,007	648	9,875	5,835	46,925
2062	4,601	10,532	1,112	111	1,897	81	18,333	4,392	2,854	1,569	1,254	746	10,815	7,517	54,442
2063	952	1,078	1,323	175	1,687	93	5,309	4,411	2,274	1,032	948	546	9,211	-3,902	50,540
2064	685	837	1,331	193	1,887	93	5,026	4,401	2,257	777	779	434	8,649	-3,623	46,917
2065	940	738	1,309	201	1,897	93	5,178	4,404	2,165	562	721	387	8,239	-3,061	43,856
2066	1,204	656	986	195	1,897	93	5,032	4,404	2,150	419	637	384	7,995	-2,963	40,893
2067	881	565	401	206	1,897	94	4,043	4,402	2,104	275	564	353	7,698	-3,654	37,238
2068	3,528	8,291	458	152	1,887	82	14,398	4,394	2,464	620	810	534	8,822	5,576	42,815
Average Water Budget over Simulation Period (2019-2068)															
Average	2,273	4,442	1,243	162	1,868	86	10,073	4,357	2,422	992	914	532	9,217	856	
Total	113,627	222,085	62,156	8,086	93,385	4,313	503,652	217,845	121,121	49,597	45,687	26,587	460,838	42,815	
Average Water Budget over Implementation Period (2022-2041)															
Average	2,029	3,748	1,261	165	1,856	86	9,146	4,326	2,362	929	877	509	9,003	142	
Total	40,583	74,968	25,213	3,304	37,120	1,728	182,915	86,528	47,231	18,577	17,549	10,183	180,069	2,846	
Average Water Budget over Sustainability Period (2042-2068)															
Average	2,268	4,507	1,193	163	1,878	87	10,095	4,383	2,437	994	916	536	9,267	828	
Total	61,232	121,692	32,204	4,396	50,698	2,344	272,566	118,350	65,788	26,840	24,743	14,481	250,200	22,366	
Average Water Budget over GSP Period (2019-2021)															
Average	3,937	8,475	1,580	128	1,856	80	16,057	4,322	2,701	1,394	1,132	641	10,190	5,867	
Total	11,812	25,425	4,740	385	5,568	241	48,171	12,967	8,103	4,181	3,395	1,923	30,569	17,602	

Table 12 - Bedford MA Water Balance (in acre-feet per year) - Projected Future Baseline Scenario

	INFLOWS							OUTFLOWS							
Simulation Year	Surface Recharge	GW-SW	Quarry Recharge	Mountain Front Recharge	WRF Perc Ponds	Boundary Inflow	Total Inflow	Wells	GW-SW	Quarry Outflow	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	4,825	3,730	107	1,008	1,856	71	11,597	1,310	1,479	2,911	1,125	514	7,339	4,258	4,258
2020	799	1,440	151	1,008	1,856	88	5,341	1,307	1,284	2,546	828	494	6,459	-1,118	3,140
2021	2,312	2,389	128	1,007	1,856	83	7,775	1,309	1,407	2,647	992	558	6,913	862	4,001
2022	622	1,070	173	1,010	1,856	91	4,823	1,305	1,008	2,358	766	439	5,876	-1,053	2,948
2023	758	887	185	1,012	1,856	91	4,791	1,303	795	2,220	685	369	5,373	-582	2,367
2024	3,335	2,923	118	905	1,856	77	9,214	1,312	1,351	2,652	1,005	571	6,891	2,323	4,689
2025	598	1,004	167	846	1,856	91	4,562	1,305	957	2,392	751	461	5,867	-1,305	3,385
2026	769	798	184	653	1,856	90	4,351	1,304	632	2,225	587	358	5,106	-754	2,630
2027	1,428	2,282	159	613	1,856	84	6,421	1,306	806	2,383	643	442	5,580	841	3,471
2028	354	652	194	668	1,856	92	3,816	1,303	580	2,179	508	344	4,914	-1,099	2,372
2029	1,695	1,843	159	518	1,856	84	6,155	1,306	614	2,293	615	416	5,245	910	3,283
2030	619	624	194	377	1,856	88	3,758	1,303	429	2,152	467	317	4,668	-910	2,372
2031	6,177	4,284	82	788	1,856	63	13,251	1,313	1,990	2,934	1,455	654	8,346	4,905	7,277
2032	1,101	1,682	136	1,015	1,856	83	5,873	1,309	1,632	2,667	1,012	638	7,258	-1,385	5,893
2033	299	1,082	183	973	1,856	91	4,485	1,303	1,051	2,320	701	442	5,817	-1,332	4,560
2034	314	934	194	918	1,856	91	4,308	1,302	865	2,161	532	364	5,225	-917	3,643
2035	964	1,276	182	877	1,856	84	5,238	1,304	773	2,183	568	388	5,216	22	3,666
2036	2,336	2,744	133	628	1,856	80	7,777	1,309	1,051	2,577	811	564	6,312	1,465	5,131
2037	3,023	2,732	110	699	1,856	79	8,499	1,310	1,457	2,767	1,061	662	7,257	1,243	6,374
2038	697	1,013	168	819	1,856	91	4,645	1,305	963	2,400	767	504	5,939	-1,294	5,079
2039	509	780	189	823	1,856	91	4,248	1,303	718	2,207	601	411	5,240	-991	4,088
2040	661	594	199	819	1,856	92	4,220	1,303	507	2,094	533	364	4,801	-581	3,507
2041	861	494	195	624	1,856	92	4,121	1,303	372	2,065	456	343	4,538	-417	3,091
2042	621	397	205	270	1,856	92	3,442	1,302	244	2,015	378	309	4,247	-805	2,286
2043	2,305	2,556	152	313	1,856	80	7,263	1,307	559	2,363	606	466	5,300	1,963	4,248
2044	4,780	3,528	99	720	1,856	71	11,053	1,313	1,690	2,855	1,233	674	7,764	3,289	7,537
2045	798	1,486	150	981	1,856	87	5,359	1,307	1,354	2,578	859	587	6,685	-1,326	6,211
2046	2,312	2,433	126	1,168	1,856	83	7,978	1,309	1,543	2,669	1,044	655	7,220	758	6,970
2047	620	1,256	167	1,281	1,856	95	5,275	1,310	1,221	2,427	851	545	6,354	-1,078	5,891
2048	754	1,053	182	1,131	1,887	103	5,110	1,325	965	2,340	767	485	5,882	-772	5,119
2049	3,417	3,052	116	918	1,897	77	9,477	1,333	1,519	2,763	1,091	681	7,388	2,090	7,209
2050	580	1,088	169	855	1,897	102	4,691	1,327	1,048	2,481	795	557	6,208	-1,517	5,692
2051	771	992	184	663	1,897	111	4,618	1,326	722	2,314	628	450	5,440	-823	4,869
2052	1,431	2,460	156	623	1,887	98	6,655	1,328	893	2,475	688	564	5,948	707	5,576
2053	327	713	196	681	1,897	120	3,934	1,325	641	2,257	538	441	5,200	-1,267	4,309
2054	1,725	2,082	158	528	1,897	100	6,488	1,329	698	2,401	656	532	5,617	872	5,181
2055	614	781	193	384	1,897	110	3,979	1,325	510	2,245	503	421	5,005	-1,026	4,155
2056	6,274	4,461	78	802	1,887	65	13,566	1,334	2,202	3,030	1,546	769	8,880	4,686	8,841
2057	1,097	1,783	137	1,031	1,897	103	6,047	1,330	1,722	2,729	1,048	733	7,562	-1,515	7,326
2058	274	1,141	186	985	1,897	149	4,631	1,325	1,113	2,389	724	492	6,044	-1,413	5,912
2059	287	981	197	931	1,897	160	4,452	1,324	919	2,233	548	400	5,425	-973	4,940
2060	961	1,531	178	884	1,887	139	5,581	1,325	839	2,285	601	467	5,517	64	5,004
2061	2,398	2,849	133	628	1,897	113	8,018	1,330	1,151	2,669	850	648	6,649	1,369	6,373
2062	3,058	2,844	111	699	1,897	103	8,712	1,332	1,566	2,854	1,106	746	7,604	1,108	7,481
2063	679	1,078	175	833	1,687	154	4,607	1,340	1,032	2,274	790	546	5,981	-1,375	6,106
2064	484	837	193	837	1,887	171	4,409	1,324	777	2,257	622	434	5,414	-1,006	5,100
2065	643	666	201	835	1,897	173	4,415	1,325	562	2,165	554	387	4,992	-577	4,523
2066	840	592	195	636	1,897	166	4,325	1,325	419	2,150	476	384	4,755	-429	4,094
2067	599	473	206	274	1,897	161	3,609	1,324	275	2,104	396	353	4,451	-842	3,252
2068	2,334	2,704	152	318	1,887	121	7,516	1,328	618	2,464	639	534	5,583	1,933	5,185
Average Water Budget over Simulation Period (2019-2068)															
Average	1,521	1,661	162	776	1,868	102	6,090	1,315	990	2,422	760	498	5,986	104	
Total	76,037	83,075	8,086	38,820	93,385	5,077	304,480	65,768	49,519	121,121	38,010	24,878	299,295	5,185	
Average Water Budget over Implementation Period (2022-2041)															
Average	1,356	1,485	165	779	1,856	86	5,728	1,305	927	2,362	726	453	5,773	-46	
Total	27,119	29,699	3,304	15,588	37,120	1,728	114,557	26,109	18,550	47,231	14,525	9,052	115,468	-911	
Average Water Budget over Sustainability Period (2042-2068)															
Average	1,518	1,697	163	748	1,878	115	6,119	1,323	993	2,437	761	528	6,041	78	
Total	40,982	45,817	4,396	20,209	50,698	3,108	165,210	35,732	26,798	65,788	20,539	14,260	163,116	2,094	
Average Water Budget over GSP Period (2019-2021)															
Average	2,645	2,520	128	1,008	1,856	80	8,237	1,309	1,390	2,701	982	522	6,904	1,334	
Total	7,936	7,559	385	3,023	5,568	241	24,712	3,926	4,170	8,103	2,945	1,566	20,711	4,001	

Table 13 - Coldwater MA Water Balance (in acre-feet per year) - Projected Future Baseline Scenario

	INFLOWS							OUTFLOWS						
Simulation Year	Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	Boundary Inflow	Total Inflow	Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	2,301	12,463	572	0	145	15,481	3,009	0	7	153	0	3,169	12,312	12,312
2020	374	227	573	0	108	1,282	3,023	0	0	146	0	3,169	-1,887	10,425
2021	1,202	5,176	571	0	104	7,053	3,009	0	3	151	0	3,162	3,891	14,315
2022	283	50	577	0	85	994	3,028	0	0	157	0	3,185	-2,191	12,124
2023	331	121	580	0	82	1,113	3,026	0	0	165	0	3,192	-2,079	10,045
2024	1,642	7,522	530	0	98	9,792	3,015	0	6	153	0	3,174	6,618	16,664
2025	254	0	490	0	78	822	3,028	0	0	155	0	3,183	-2,362	14,302
2026	420	323	386	0	72	1,201	3,022	0	0	151	0	3,173	-1,972	12,330
2027	771	3,482	366	0	77	4,696	3,015	0	1	139	0	3,155	1,541	13,870
2028	172	0	429	0	65	666	3,031	0	0	147	0	3,179	-2,512	11,358
2029	891	3,533	369	0	76	4,868	3,009	0	1	149	0	3,159	1,709	13,066
2030	304	137	301	0	70	812	3,026	0	0	151	0	3,177	-2,365	10,701
2031	3,006	15,268	504	0	105	18,883	3,003	0	11	164	0	3,178	15,704	26,405
2032	571	549	658	0	62	1,841	3,015	0	2	140	0	3,156	-1,315	25,091
2033	157	0	638	0	33	828	3,028	0	0	145	0	3,174	-2,345	22,745
2034	159	0	579	0	25	764	3,019	0	0	133	0	3,152	-2,388	20,357
2035	565	756	549	0	35	1,905	3,021	0	0	141	0	3,162	-1,257	19,100
2036	1,217	5,882	428	0	51	7,577	3,015	0	3	155	0	3,173	4,404	23,505
2037	1,523	7,535	418	0	56	9,531	3,009	0	3	145	0	3,157	6,374	29,879
2038	288	0	493	0	24	806	3,021	0	0	155	0	3,176	-2,370	27,509
2039	217	0	499	0	11	728	3,031	0	0	154	0	3,185	-2,458	25,051
2040	312	57	477	0	10	856	3,029	0	0	165	0	3,193	-2,337	22,714
2041	380	55	356	0	16	806	3,028	0	0	158	0	3,186	-2,379	20,334
2042	299	79	134	0	22	535	3,027	0	0	165	1	3,193	-2,658	17,676
2043	1,185	5,447	148	0	44	6,823	3,020	0	1	168	1	3,190	3,633	21,309
2044	2,284	12,343	382	0	65	15,075	3,015	0	7	163	0	3,184	11,892	33,201
2045	374	227	558	0	26	1,184	3,023	0	0	146	0	3,169	-1,985	31,216
2046	1,202	5,267	675	0	20	7,164	3,009	0	3	151	0	3,164	4,000	35,216
2047	281	50	774	0	0	1,105	3,039	0	0	158	3	3,200	-2,095	33,121
2048	325	130	669	0	0	1,124	3,074	0	0	169	10	3,253	-2,129	30,991
2049	1,674	7,875	525	0	16	10,090	3,066	0	6	155	0	3,227	6,863	37,854
2050	239	0	484	0	0	724	3,079	0	0	158	9	3,246	-2,523	35,331
2051	415	354	380	0	0	1,150	3,073	0	0	154	20	3,246	-2,097	33,235
2052	768	3,649	359	0	0	4,776	3,061	0	1	142	13	3,217	1,559	34,794
2053	154	0	424	0	0	578	3,083	0	0	149	27	3,259	-2,681	32,113
2054	901	3,689	363	0	0	4,953	3,061	0	1	152	14	3,227	1,726	33,839
2055	295	164	295	0	0	754	3,077	0	0	154	20	3,251	-2,497	31,341
2056	3,048	15,626	500	0	28	19,202	3,049	0	11	167	0	3,228	15,974	47,315
2057	564	596	657	0	0	1,816	3,066	0	2	142	18	3,228	-1,411	45,904
2058	140	0	636	0	0	777	3,080	0	0	148	56	3,283	-2,507	43,398
2059	142	0	577	0	0	719	3,070	0	0	135	67	3,272	-2,553	40,845
2060	563	817	545	0	0	1,924	3,067	0	0	144	54	3,265	-1,341	39,503
2061	1,241	6,062	422	0	0	7,725	3,066	0	3	157	32	3,258	4,466	43,969
2062	1,542	7,688	413	0	0	9,643	3,060	0	3	148	22	3,234	6,409	50,378
2063	273	0	490	0	0	763	3,072	0	0	158	61	3,290	-2,527	47,851
2064	200	0	494	0	0	695	3,078	0	0	157	77	3,312	-2,617	45,234
2065	297	72	473	0	0	842	3,080	0	0	167	80	3,327	-2,484	42,750
2066	364	64	351	0	0	779	3,079	0	0	161	73	3,313	-2,533	40,216
2067	283	91	127	0	0	501	3,078	0	0	168	69	3,316	-2,815	37,401
2068	1,194	5,587	141	0	0	6,922	3,067	0	2	170	42	3,280	3,641	41,043
Average Water Budget over Simulation Period (2019-2068)														
Average	752	2,780	467	0	34	4,033	3,042	0	2	154	15	3,212	821	
Total	37,590	139,010	23,337	0	1,709	201,646	152,078	0	78	7,677	770	160,603	41,043	
Average Water Budget over Implementation Period (2022-2041)														
Average	673	2,263	481	0	57	3,474	3,021	0	1	151	0	3,173	301	
Total	13,464	45,269	9,625	0	1,131	69,489	60,419	0	27	3,024	0	63,470	6,019	
Average Water Budget over Sustainability Period (2042-2068)														
Average	750	2,810	444	0	8	4,013	3,060	0	2	156	29	3,246	767	
Total	20,250	75,875	11,995	0	221	108,341	82,618	0	41	4,204	770	87,633	20,708	
Average Water Budget over GSP Period (2019-2021)														
Average	1,292	5,955	572	0	119	7,939	3,014	0	3	150	0	3,167	4,772	
Total	3,877	17,865	1,716	0	357	23,816	9,041	0	10	450	0	9,501	14,315	

Table 14 - Change in Groundwater in Storage (in acre-feet per year) - Projected Future Baseline Scenario

Simulation Year	Net Change in Groundwater in Storage: Coldwater Hydrologic Area	Net Change in Groundwater in Storage: Bedford Hydrologic Area	Annual Change in Groundwater in Storage	Cumulative Storage Change
2019	12,312	3,967	16,279	16,279
2020	-1,887	-1,334	-3,221	13,058
2021	3,891	654	4,544	17,602
2022	-2,191	-1,223	-3,414	14,188
2023	-2,079	-745	-2,824	11,364
2024	6,618	2,126	8,744	20,108
2025	-2,362	-1,460	-3,822	16,287
2026	-1,972	-898	-2,871	13,416
2027	1,541	687	2,228	15,644
2028	-2,512	-1,229	-3,742	11,902
2029	1,709	759	2,468	14,369
2030	-2,365	-1,050	-3,415	10,954
2031	15,704	4,695	20,399	31,353
2032	-1,315	-1,509	-2,824	28,529
2033	-2,345	-1,397	-3,743	24,786
2034	-2,388	-967	-3,355	21,431
2035	-1,257	-48	-1,305	20,126
2036	4,404	1,364	5,768	25,894
2037	6,374	1,131	7,505	33,399
2038	-2,370	-1,343	-3,713	29,686
2039	-2,458	-1,014	-3,472	26,215
2040	-2,337	-601	-2,938	23,276
2041	-2,379	-449	-2,829	20,448
2042	-2,658	-854	-3,512	16,936
2043	3,633	1,874	5,506	22,442
2044	11,892	3,158	15,050	37,491
2045	-1,985	-1,377	-3,362	34,129
2046	4,000	718	4,719	38,848
2047	-2,095	-1,078	-3,173	35,674
2048	-2,129	-772	-2,902	32,773
2049	6,863	2,058	8,921	41,693
2050	-2,523	-1,517	-4,040	37,654
2051	-2,097	-823	-2,919	34,734
2052	1,559	707	2,266	37,000
2053	-2,681	-1,267	-3,948	33,053
2054	1,726	872	2,597	35,650
2055	-2,497	-1,027	-3,524	32,126
2056	15,974	4,630	20,604	52,730
2057	-1,411	-1,515	-2,926	49,803
2058	-2,507	-1,413	-3,920	45,883
2059	-2,553	-973	-3,526	42,358
2060	-1,341	64	-1,278	41,080
2061	4,466	1,369	5,835	46,915
2062	6,409	1,108	7,517	54,432
2063	-2,527	-1,375	-3,902	50,530
2064	-2,617	-1,006	-3,623	46,908
2065	-2,484	-577	-3,061	43,846
2066	-2,533	-429	-2,963	40,884
2067	-2,815	-847	-3,662	37,222
2068	3,641	1,931	5,572	42,794
Average Water Budget over Simulation Period (2019-2068)				
Average	821	35	856	
Total	41,043	1,751	42,794	
Average Water Budget over Implementation Period (2022-2041)				
Average	301	-159	142	
Total	6,019	-3,173	2,846	
Average Water Budget over Sustainability Period (2042-2068)				
Average	767	61	828	
Total	20,708	1,638	22,346	
Average Water Budget over GSP Period (2019-2021)				
Average	4,772	1,096	5,867	
Total	14,315	3,287	17,602	

Table 15 - Bedford/Coldwater GW Basin Water Balance (in acre-feet per year) - Projected Future Growth plus Climate Change Scenario

Simulation Year	INFLOWS Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	WRF Perc Ponds	Boundary Inflow	Total Inflow	OUTFLOWS Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	8,073	16,119	1,632	299	2,139	71	28,334	5,021	2,866	1,737	1,553	607	11,784	16,549	16,549
2020	1,871	1,689	1,632	456	2,139	88	7,874	5,019	2,504	1,637	1,216	551	10,927	-3,053	13,497
2021	4,391	7,441	1,628	409	2,139	83	16,091	5,018	2,595	1,838	1,480	572	11,503	4,588	18,085
2022	1,545	1,258	1,637	490	2,139	91	7,160	5,027	2,405	1,396	1,143	476	10,445	-3,285	14,800
2023	1,743	1,172	1,642	510	2,139	91	7,298	5,028	2,321	1,142	1,076	398	9,965	-2,668	12,132
2024	5,728	10,357	1,470	380	2,139	77	20,151	5,016	2,658	1,837	1,543	605	11,660	8,492	20,624
2025	1,343	1,112	1,344	486	2,139	91	6,516	5,026	2,408	1,316	1,124	496	10,371	-3,855	16,768
2026	1,939	1,359	1,069	512	2,139	90	7,108	5,025	2,322	997	955	373	9,673	-2,564	14,204
2027	3,177	5,660	1,045	472	2,139	84	12,578	5,010	2,420	1,285	1,057	442	10,213	2,364	16,568
2028	910	824	1,185	528	2,139	92	5,678	5,021	2,292	940	853	361	9,466	-3,788	12,780
2029	3,419	5,353	975	475	2,139	84	12,445	5,009	2,358	1,033	1,055	401	9,856	2,589	15,370
2030	1,563	999	779	523	2,139	88	6,092	5,024	2,289	817	863	334	9,327	-3,235	12,134
2031	10,087	19,400	1,313	304	2,139	63	33,306	5,019	2,885	2,591	2,221	717	13,432	19,874	32,009
2032	2,152	2,186	1,613	432	2,139	83	8,606	5,021	2,590	2,048	1,442	644	11,744	-3,138	28,871
2033	838	1,097	1,503	518	2,139	91	6,187	5,022	2,348	1,284	987	418	10,059	-3,872	24,999
2034	842	950	1,400	542	2,139	91	5,965	5,020	2,244	1,049	770	320	9,403	-3,438	21,561
2035	2,277	2,241	1,322	513	2,139	84	8,577	5,012	2,301	1,067	884	367	9,630	-1,053	20,507
2036	4,385	8,461	1,048	416	2,139	80	16,529	5,017	2,562	1,470	1,292	535	10,877	5,652	26,159
2037	5,604	10,141	1,131	370	2,139	79	19,465	5,014	2,705	1,976	1,647	634	11,976	7,489	33,648
2038	1,490	1,153	1,327	488	2,139	91	6,689	5,026	2,415	1,356	1,138	487	10,423	-3,734	29,915
2039	1,144	912	1,343	528	2,139	91	6,159	5,023	2,288	1,038	927	359	9,635	-3,476	26,438
2040	1,555	817	1,324	515	2,139	92	6,442	5,030	2,237	819	887	276	9,249	-2,808	23,631
2041	1,869	796	1,026	529	2,139	92	6,452	5,018	2,213	726	821	286	9,064	-2,612	21,019
2042	1,517	642	482	542	2,139	93	5,415	5,029	2,197	548	751	271	8,796	-3,381	17,638
2043	4,321	7,838	537	448	2,139	80	15,364	5,021	2,427	958	1,105	424	9,935	5,429	23,066
2044	7,992	15,635	1,143	330	2,139	71	27,310	5,020	2,831	2,272	1,939	674	12,737	14,574	37,640
2045	1,874	1,766	1,570	454	2,139	87	7,891	5,019	2,532	1,804	1,303	569	11,226	-3,335	34,305
2046	4,391	7,564	1,856	406	2,139	83	16,439	5,019	2,616	2,008	1,556	587	11,786	4,653	38,958
2047	1,538	1,399	2,048	486	2,139	91	7,701	5,046	2,440	1,640	1,229	505	10,861	-3,159	35,799
2048	1,717	1,380	1,817	512	2,176	93	7,695	5,104	2,407	1,352	1,171	450	10,484	-2,789	33,010
2049	5,802	10,901	1,480	380	2,197	77	20,836	5,100	2,749	2,042	1,632	639	12,163	8,674	41,684
2050	1,267	1,175	1,358	495	2,197	93	6,585	5,110	2,481	1,413	1,163	521	10,687	-4,102	37,582
2051	1,912	1,614	1,072	517	2,197	92	7,403	5,109	2,402	1,100	999	399	10,008	-2,605	34,977
2052	3,151	5,993	1,043	471	2,176	85	12,920	5,086	2,494	1,385	1,104	487	10,557	2,363	37,339
2053	819	877	1,188	540	2,197	93	5,715	5,105	2,353	1,004	879	389	9,730	-4,015	33,324
2054	3,438	5,762	981	475	2,197	85	12,938	5,093	2,450	1,134	1,094	442	10,213	2,725	36,049
2055	1,522	1,214	783	529	2,197	90	6,334	5,108	2,370	903	902	374	9,657	-3,322	32,726
2056	10,185	20,021	1,321	294	2,176	65	34,062	5,102	2,969	2,827	2,323	764	13,985	20,077	52,803
2057	2,105	2,442	1,629	439	2,197	85	8,897	5,104	2,659	2,167	1,493	683	12,107	-3,210	49,593
2058	750	1,154	1,520	529	2,197	93	6,243	5,105	2,416	1,360	1,012	448	10,341	-4,097	45,495
2059	751	989	1,413	554	2,197	93	5,997	5,104	2,311	1,101	786	334	9,637	-3,639	41,856
2060	2,247	2,545	1,333	512	2,176	85	8,898	5,088	2,375	1,150	921	401	9,936	-1,037	40,819
2061	4,436	8,786	1,039	419	2,197	81	16,958	5,101	2,639	1,580	1,346	571	11,237	5,722	46,540
2062	5,639	10,443	1,122	372	2,197	81	19,854	5,098	2,795	2,086	1,698	669	12,346	7,508	54,049
2063	1,415	1,199	1,337	498	2,197	93	6,739	5,110	2,479	1,422	1,164	509	10,684	-3,945	50,103
2064	1,060	954	1,346	540	2,176	93	6,169	5,100	2,337	1,082	948	372	9,839	-3,670	46,433
2065	1,481	919	1,330	553	2,197	93	6,574	5,112	2,288	880	906	315	9,501	-2,927	43,506
2066	1,793	934	1,027	539	2,197	93	6,584	5,102	2,289	800	847	315	9,354	-2,770	40,736
2067	1,437	799	476	550	2,197	94	5,553	5,113	2,275	614	783	299	9,083	-3,530	37,206
2068	4,323	8,167	530	451	2,176	82	15,728	5,098	2,508	1,050	1,146	475	10,277	5,451	42,657
Average Water Budget over Simulation Period (2019-2068)															
Average	2,937	4,492	1,263	471	2,161	86	11,410	5,055	2,466	1,382	1,183	471	10,557	853	
Total	146,828	224,610	63,167	23,530	108,057	4,314	570,506	252,772	123,318	69,080	59,134	23,544	527,849	42,657	
Average Water Budget over Implementation Period (2022-2041)															
Average	2,680	3,812	1,275	477	2,139	86	10,470	5,020	2,413	1,309	1,134	446	10,323	147	
Total	53,609	76,249	25,495	9,532	42,790	1,728	209,402	100,408	48,262	26,185	22,684	8,930	206,469	2,934	
Average Water Budget over Sustainability Period (2042-2068)															
Average	2,922	4,560	1,214	475	2,180	87	11,437	5,085	2,485	1,396	1,193	477	10,636	801	
Total	78,884	123,112	32,780	12,835	58,849	2,345	308,804	137,306	67,091	37,684	32,201	12,885	287,166	21,638	
Average Water Budget over GSP Period (2019-2021)															
Average	4,778	8,416	1,631	388	2,139	80	17,433	5,019	2,655	1,737	1,417	577	11,405	6,028	
Total	14,335	25,249	4,892	1,164	6,418	241	52,299	15,058	7,965	5,211	4,250	1,730	34,214	18,085	

Table 16 - Bedford MA Water Balance (in acre-feet per year) - Projected Future Growth plus Climate Change Scenario

Simulation Year	INFLOWS Surface Recharge	GW-SW	Quarry Recharge	Mountain Front Recharge	WRF Perc Ponds	Boundary Inflow	Total Inflow	OUTFLOWS Wells	GW-SW	Quarry Outflow	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	5,577	3,665	299	1,082	2,139	71	12,833	1,895	1,730	2,866	1,388	453	8,332	4,501	4,501
2020	1,355	1,462	456	1,081	2,139	88	6,581	1,883	1,637	2,504	1,055	429	7,508	-927	3,574
2021	3,032	2,266	409	1,080	2,139	83	9,009	1,884	1,835	2,595	1,315	448	8,078	932	4,506
2022	1,125	1,210	490	1,083	2,139	91	6,138	1,880	1,396	2,405	972	372	7,025	-888	3,618
2023	1,285	1,052	510	1,085	2,139	91	6,163	1,882	1,142	2,321	895	298	6,538	-375	3,243
2024	3,966	2,841	380	965	2,139	77	10,368	1,888	1,831	2,658	1,375	485	8,238	2,130	5,373
2025	996	1,111	486	885	2,139	91	5,709	1,881	1,316	2,408	952	402	6,959	-1,250	4,123
2026	1,359	1,036	512	712	2,139	90	5,848	1,879	997	2,322	791	281	6,270	-422	3,701
2027	2,181	2,180	472	696	2,139	84	7,752	1,881	1,283	2,420	905	341	6,830	922	4,623
2028	656	824	528	764	2,139	92	5,003	1,879	940	2,292	691	276	6,078	-1,074	3,548
2029	2,383	1,824	475	605	2,139	84	7,511	1,880	1,032	2,358	891	304	6,466	1,045	4,593
2030	1,118	863	523	469	2,139	88	5,201	1,882	817	2,289	697	244	5,929	-728	3,865
2031	6,947	4,146	304	822	2,139	63	14,422	1,891	2,581	2,885	2,041	589	9,987	4,435	8,300
2032	1,550	1,641	432	1,005	2,139	83	6,851	1,884	2,046	2,590	1,289	563	8,373	-1,522	6,778
2033	595	1,097	518	943	2,139	91	5,383	1,879	1,284	2,348	828	370	6,709	-1,325	5,453
2034	600	950	542	903	2,139	91	5,226	1,878	1,049	2,244	626	280	6,076	-849	4,603
2035	1,580	1,486	513	868	2,139	84	6,670	1,878	1,067	2,301	730	309	6,284	385	4,989
2036	3,004	2,586	416	686	2,139	80	8,912	1,883	1,467	2,562	1,122	461	7,496	1,416	6,405
2037	3,878	2,612	370	751	2,139	79	9,829	1,886	1,973	2,705	1,487	556	8,607	1,223	7,627
2038	1,110	1,153	488	861	2,139	91	5,843	1,880	1,356	2,415	969	444	7,063	-1,220	6,407
2039	839	912	528	871	2,139	91	5,381	1,878	1,038	2,288	758	329	6,292	-910	5,497
2040	1,126	760	515	870	2,139	92	5,503	1,879	819	2,237	707	246	5,889	-386	5,111
2041	1,392	744	529	692	2,139	92	5,588	1,878	726	2,213	648	246	5,712	-123	4,988
2042	1,094	565	542	359	2,139	93	4,793	1,878	548	2,197	570	222	5,416	-623	4,365
2043	3,017	2,399	448	402	2,139	80	8,486	1,882	957	2,427	922	351	6,538	1,948	6,312
2044	5,514	3,300	330	790	2,139	71	12,145	1,892	2,266	2,831	1,763	585	9,336	2,808	9,121
2045	1,358	1,540	454	1,046	2,139	87	6,625	1,883	1,803	2,532	1,143	524	7,884	-1,259	7,862
2046	3,032	2,299	406	1,219	2,139	83	9,178	1,884	2,006	2,616	1,391	544	8,441	738	8,600
2047	1,121	1,350	486	1,319	2,139	91	6,507	1,888	1,640	2,440	1,059	487	7,514	-1,007	7,593
2048	1,274	1,250	512	1,185	2,176	93	6,490	1,910	1,352	2,407	987	438	7,093	-603	6,989
2049	4,026	3,023	380	981	2,197	77	10,683	1,919	2,037	2,749	1,462	600	8,767	1,916	8,905
2050	952	1,175	495	903	2,197	93	5,815	1,911	1,413	2,481	988	511	7,304	-1,489	7,416
2051	1,351	1,253	517	722	2,197	92	6,131	1,910	1,100	2,402	832	394	6,637	-506	6,910
2052	2,172	2,343	471	700	2,176	85	7,948	1,910	1,384	2,494	949	471	7,209	740	7,650
2053	601	877	540	772	2,197	98	5,086	1,909	1,004	2,353	715	389	6,371	-1,285	6,365
2054	2,407	2,078	475	615	2,197	85	7,858	1,911	1,133	2,450	928	431	6,854	1,004	7,369
2055	1,101	1,046	529	478	2,197	90	5,441	1,913	903	2,370	734	369	6,288	-848	6,521
2056	7,020	4,413	294	832	2,176	65	14,800	1,926	2,817	2,969	2,140	713	10,566	4,234	10,756
2057	1,529	1,838	439	1,022	2,197	85	7,109	1,915	2,166	2,659	1,338	681	8,759	-1,650	9,106
2058	542	1,154	529	962	2,197	130	5,514	1,909	1,360	2,416	850	448	6,983	-1,469	7,637
2059	546	989	554	919	2,197	142	5,347	1,908	1,101	2,311	640	334	6,294	-947	6,690
2060	1,567	1,722	512	882	2,176	112	6,972	1,906	1,150	2,375	765	401	6,597	375	7,065
2061	3,050	2,727	419	681	2,197	86	9,161	1,914	1,577	2,639	1,173	571	7,874	1,286	8,351
2062	3,906	2,762	372	746	2,197	81	10,064	1,917	2,083	2,795	1,534	666	8,995	1,068	9,419
2063	1,068	1,199	498	874	2,197	131	5,967	1,911	1,422	2,479	992	509	7,312	-1,345	8,074
2064	788	954	540	878	2,176	149	5,485	1,906	1,082	2,337	776	372	6,474	-989	7,086
2065	1,085	847	553	880	2,197	149	5,712	1,908	880	2,288	723	315	6,114	-402	6,684
2066	1,349	869	539	698	2,197	138	5,790	1,908	800	2,289	672	315	5,985	-195	6,489
2067	1,048	705	550	360	2,197	129	4,990	1,909	614	2,275	599	299	5,695	-705	5,784
2068	3,026	2,579	451	402	2,176	88	8,722	1,910	1,048	2,508	960	475	6,901	1,821	7,604
Average Water Budget over Simulation Period (2019-2068)															
Average	2,064	1,714	471	828	2,161	93	7,331	1,895	1,380	2,466	1,015	423	7,179	152	
Total	103,198	85,678	23,530	41,405	108,057	4,674	366,543	94,735	69,009	123,318	50,737	21,140	358,938	7,604	
Average Water Budget over Implementation Period (2022-2041)															
Average	1,884	1,551	477	827	2,139	86	6,965	1,881	1,308	2,413	969	370	6,941	24	
Total	37,689	31,029	9,532	16,534	42,790	1,728	139,301	37,625	26,161	48,262	19,376	7,395	138,819	482	
Average Water Budget over Sustainability Period (2042-2068)															
Average	2,057	1,750	475	801	2,180	100	7,364	1,905	1,394	2,485	1,022	460	7,267	97	
Total	55,545	47,256	12,835	21,628	58,849	2,705	198,818	51,447	37,646	67,091	27,603	12,415	196,202	2,617	
Average Water Budget over GSP Period (2019-2021)															
Average	3,321	2,465	388	1,081	2,139	80	9,474	1,887	1,734	2,655	1,253	443	7,973	1,502	
Total	9,964	7,394	1,164	3,243	6,418	241	28,423	5,662	5,202	7,965	3,758	1,330	23,918	4,506	

Table 17 - Coldwater MA Water Balance (in acre-feet per year) - Projected Future Growth plus Climate Change Scenario

	INFLOWS							OUTFLOWS						
Simulation Year	Surface Recharge	GW-SW	Mountain Front Recharge	Net Quarry Ops	Boundary Inflow	Total Inflow	Wells	Net Quarry Ops	GW-SW	ET	Boundary Outflow	Total Outflow	Annual Storage Change	Cumulative Storage Change
2019	2,496	12,454	550	0	154	15,655	3,126	0	6	166	0	3,298	12,357	12,357
2020	516	227	551	0	122	1,415	3,136	0	0	161	0	3,297	-1,882	10,475
2021	1,359	5,175	548	0	123	7,205	3,134	0	2	165	0	3,302	3,903	14,378
2022	420	49	554	0	103	1,126	3,147	0	0	170	0	3,317	-2,191	12,187
2023	458	120	557	0	100	1,235	3,146	0	0	181	0	3,327	-2,092	10,095
2024	1,762	7,516	505	0	120	9,903	3,128	0	5	168	0	3,301	6,602	16,697
2025	348	0	459	0	95	902	3,146	0	0	172	0	3,318	-2,416	14,280
2026	580	323	357	0	92	1,353	3,146	0	0	165	0	3,310	-1,958	12,323
2027	996	3,480	350	0	102	4,928	3,129	0	1	151	0	3,281	1,646	13,969
2028	255	0	421	0	85	760	3,142	0	0	162	0	3,304	-2,544	11,426
2029	1,036	3,529	370	0	97	5,032	3,128	0	1	164	0	3,293	1,739	13,164
2030	445	136	310	0	91	982	3,142	0	0	165	0	3,308	-2,326	10,838
2031	3,139	15,254	491	0	127	19,011	3,128	0	10	179	0	3,317	15,694	26,532
2032	602	545	608	0	81	1,836	3,136	0	2	153	0	3,291	-1,455	25,078
2033	243	0	560	0	48	852	3,143	0	0	159	0	3,302	-2,450	22,627
2034	242	0	497	0	40	778	3,143	0	0	144	0	3,287	-2,509	20,118
2035	698	755	455	0	58	1,965	3,134	0	0	154	0	3,288	-1,323	18,795
2036	1,380	5,875	362	0	74	7,691	3,134	0	3	170	0	3,307	4,384	23,179
2037	1,726	7,530	380	0	78	9,714	3,128	0	3	160	0	3,291	6,423	29,602
2038	380	0	466	0	44	890	3,146	0	0	170	0	3,316	-2,426	27,177
2039	305	0	472	0	30	807	3,145	0	0	169	0	3,313	-2,506	24,670
2040	428	57	454	0	30	969	3,151	0	0	180	0	3,331	-2,362	22,309
2041	477	52	334	0	40	903	3,140	0	0	172	0	3,312	-2,409	19,899
2042	422	77	123	0	49	671	3,151	0	0	180	1	3,332	-2,661	17,239
2043	1,305	5,439	134	0	73	6,951	3,140	0	1	183	1	3,325	3,627	20,865
2044	2,479	12,334	353	0	89	15,255	3,129	0	6	177	0	3,312	11,943	32,809
2045	516	226	523	0	45	1,311	3,136	0	0	160	0	3,296	-1,985	30,823
2046	1,359	5,265	637	0	43	7,304	3,134	0	2	166	0	3,303	4,001	34,824
2047	417	48	729	0	18	1,213	3,158	0	0	171	0	3,329	-2,116	32,709
2048	444	130	632	0	12	1,218	3,194	0	0	184	0	3,379	-2,161	30,547
2049	1,776	7,878	499	0	39	10,192	3,181	0	6	170	0	3,357	6,835	37,382
2050	314	0	455	0	9	779	3,199	0	0	175	0	3,374	-2,595	34,788
2051	560	361	350	0	4	1,276	3,199	0	0	167	0	3,366	-2,090	32,698
2052	979	3,650	343	0	16	4,988	3,177	0	1	154	0	3,332	1,655	34,353
2053	218	0	416	0	0	634	3,195	0	0	164	5	3,364	-2,730	31,622
2054	1,031	3,684	366	0	11	5,091	3,181	0	1	167	0	3,349	1,742	33,365
2055	420	168	305	0	5	898	3,195	0	0	168	0	3,364	-2,465	30,900
2056	3,165	15,608	488	0	51	19,313	3,176	0	10	183	0	3,369	15,944	46,844
2057	576	605	607	0	2	1,791	3,189	0	2	155	0	3,346	-1,556	45,288
2058	208	0	559	0	0	766	3,196	0	0	162	37	3,395	-2,629	42,660
2059	205	0	494	0	0	700	3,196	0	0	147	49	3,392	-2,692	39,968
2060	680	823	451	0	0	1,954	3,182	0	0	157	27	3,366	-1,412	38,556
2061	1,386	6,060	357	0	0	7,803	3,187	0	3	172	5	3,368	4,435	42,991
2062	1,733	7,681	376	0	3	9,793	3,181	0	3	163	0	3,347	6,446	49,437
2063	346	0	463	0	0	810	3,199	0	0	173	38	3,410	-2,601	46,837
2064	272	0	468	0	0	739	3,193	0	0	172	56	3,421	-2,682	44,155
2065	396	72	450	0	0	918	3,204	0	0	182	56	3,443	-2,525	41,630
2066	444	65	329	0	0	838	3,193	0	0	176	45	3,414	-2,575	39,055
2067	389	94	116	0	0	599	3,204	0	0	184	38	3,426	-2,827	36,228
2068	1,297	5,587	128	0	0	7,012	3,188	0	2	186	8	3,383	3,628	39,856
Average Water Budget over Simulation Period (2019-2068)														
Average	873	2,779	435	0	48	4,135	3,161	0	1	168	7	3,337	797	
Total	43,629	138,932	21,762	0	2,405	206,727	158,037	0	71	8,397	366	166,871	39,856	
Average Water Budget over Implementation Period (2022-2041)														
Average	796	2,261	448	0	77	3,582	3,139	0	1	165	0	3,306	276	
Total	15,920	45,220	8,961	0	1,535	71,636	62,783	0	25	3,307	0	66,115	5,521	
Average Water Budget over Sustainability Period (2042-2068)														
Average	864	2,809	413	0	17	4,104	3,180	0	1	170	14	3,365	739	
Total	23,338	75,856	11,152	0	470	110,816	85,859	0	37	4,598	366	90,859	19,957	
Average Water Budget over GSP Period (2019-2021)														
Average	1,457	5,952	550	0	133	8,092	3,132	0	3	164	0	3,299	4,793	
Total	4,371	17,856	1,649	0	400	24,275	9,396	0	9	492	0	9,897	14,378	

Table 18 - Change in Groundwater in Storage (in acre-feet per year) - Projected Future Growth plus Climate Change Scenario

Simulation Year	Net Change in Groundwater in Storage: Coldwater Hydrologic Area	Net Change in Groundwater in Storage: Bedford Hydrologic Area	Annual Change in Groundwater in Storage	Cumulative Storage Change
2019	12,357	4,193	16,549	16,549
2020	-1,882	-1,171	-3,053	13,497
2021	3,903	685	4,588	18,085
2022	-2,191	-1,094	-3,285	14,800
2023	-2,092	-575	-2,668	12,132
2024	6,602	1,890	8,492	20,624
2025	-2,416	-1,439	-3,855	16,768
2026	-1,958	-607	-2,564	14,204
2027	1,646	718	2,364	16,568
2028	-2,544	-1,244	-3,788	12,780
2029	1,739	850	2,589	15,370
2030	-2,326	-910	-3,236	12,134
2031	15,694	4,181	19,874	32,008
2032	-1,455	-1,683	-3,138	28,870
2033	-2,450	-1,422	-3,872	24,998
2034	-2,509	-929	-3,438	21,560
2035	-1,323	270	-1,053	20,507
2036	4,384	1,268	5,652	26,159
2037	6,423	1,066	7,489	33,648
2038	-2,426	-1,308	-3,734	29,914
2039	-2,506	-970	-3,476	26,438
2040	-2,362	-446	-2,808	23,630
2041	-2,409	-203	-2,612	21,018
2042	-2,661	-726	-3,386	17,632
2043	3,627	1,800	5,426	23,058
2044	11,943	2,631	14,574	37,632
2045	-1,985	-1,350	-3,335	34,297
2046	4,001	652	4,653	38,950
2047	-2,116	-1,043	-3,159	35,791
2048	-2,161	-628	-2,789	33,002
2049	6,835	1,839	8,674	41,676
2050	-2,595	-1,508	-4,102	37,573
2051	-2,090	-515	-2,605	34,968
2052	1,655	707	2,363	37,331
2053	-2,730	-1,285	-4,015	33,316
2054	1,742	982	2,725	36,040
2055	-2,465	-858	-3,323	32,717
2056	15,944	4,132	20,077	52,794
2057	-1,556	-1,655	-3,210	49,584
2058	-2,629	-1,469	-4,097	45,487
2059	-2,692	-947	-3,639	41,847
2060	-1,412	375	-1,037	40,810
2061	4,435	1,286	5,722	46,532
2062	6,446	1,062	7,508	54,040
2063	-2,601	-1,345	-3,945	50,094
2064	-2,682	-989	-3,670	46,424
2065	-2,525	-402	-2,927	43,497
2066	-2,575	-195	-2,770	40,727
2067	-2,827	-710	-3,537	37,190
2068	3,628	1,819	5,447	42,637
Average Water Budget over Simulation Period (2019-2068)				
Average	797	56	853	
Total	39,856	2,781	42,637	
Average Water Budget over Implementation Period (2022-2041)				
Average	276	-129	147	
Total	5,521	-2,588	2,933	
Average Water Budget over Sustainability Period (2042-2068)				
Average	739	62	801	
Total	19,957	1,662	21,619	
Average Water Budget over GSP Period (2019-2021)				
Average	4,793	1,236	6,028	
Total	14,378	3,707	18,085	

FIGURES

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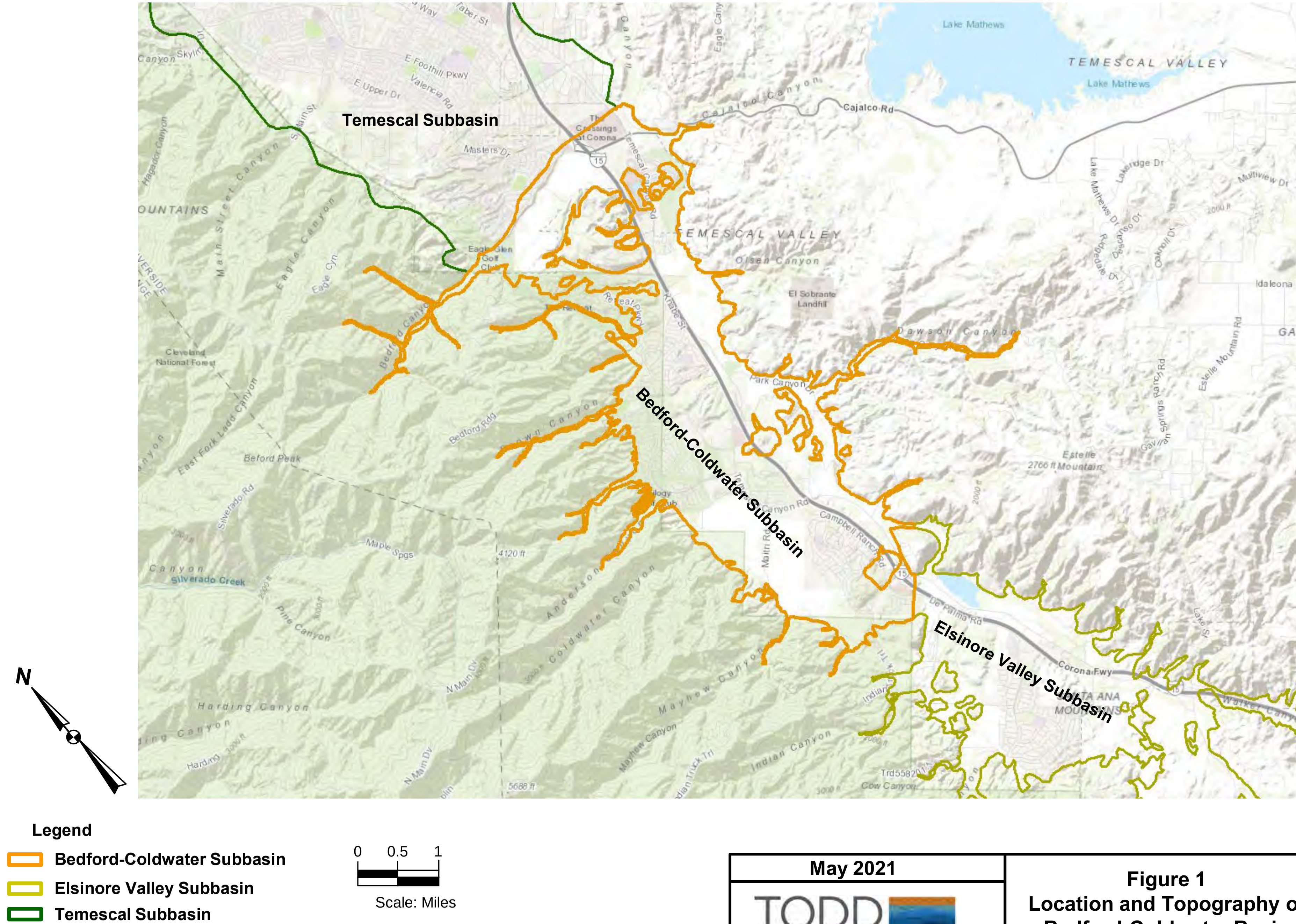

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Figure 1
Location and Topography of Bedford-Coldwater Basin

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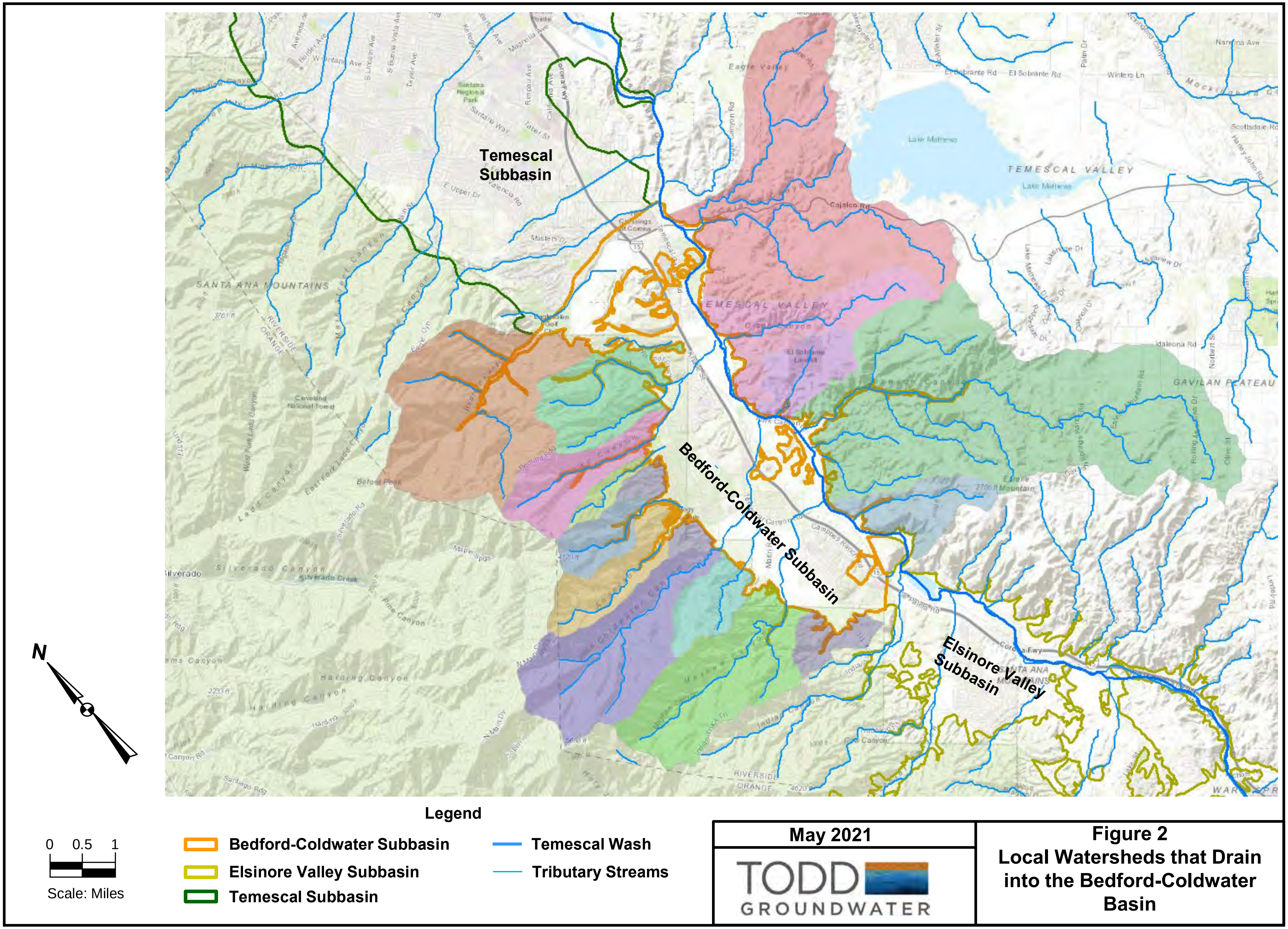

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Figure 2
Local Watersheds that Drain into the Bedford-Coldwater Basin

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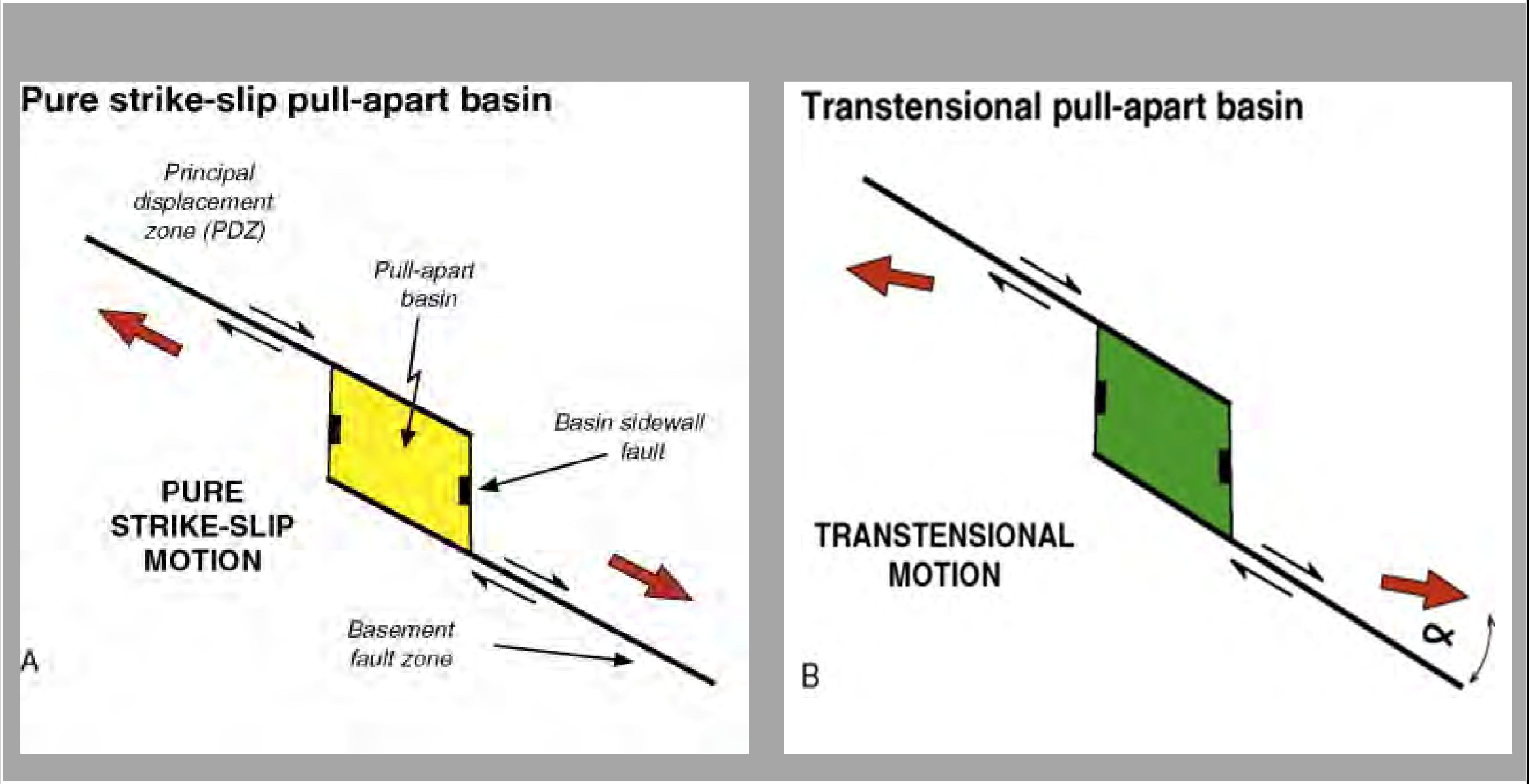

Figures Source:

J. E. Wu, K. McClay, P. Whitehouse, T. Dooley, 2012, Regional Geology and Tectonics: Principles of Geologic Analysis

May 2021	Figure 3 Schematic Plan View Showing Faulting Associated with Pull-Apart Basins
TODD GROUNDWATER	

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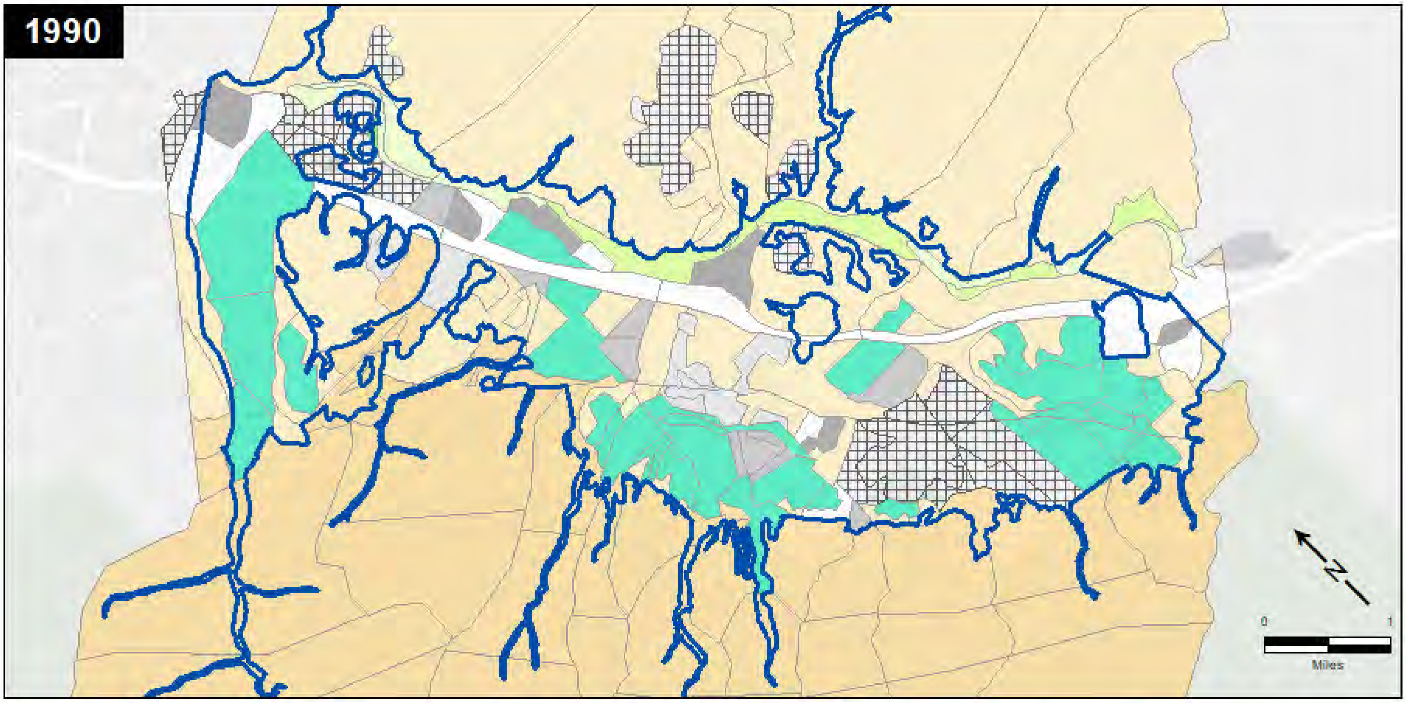

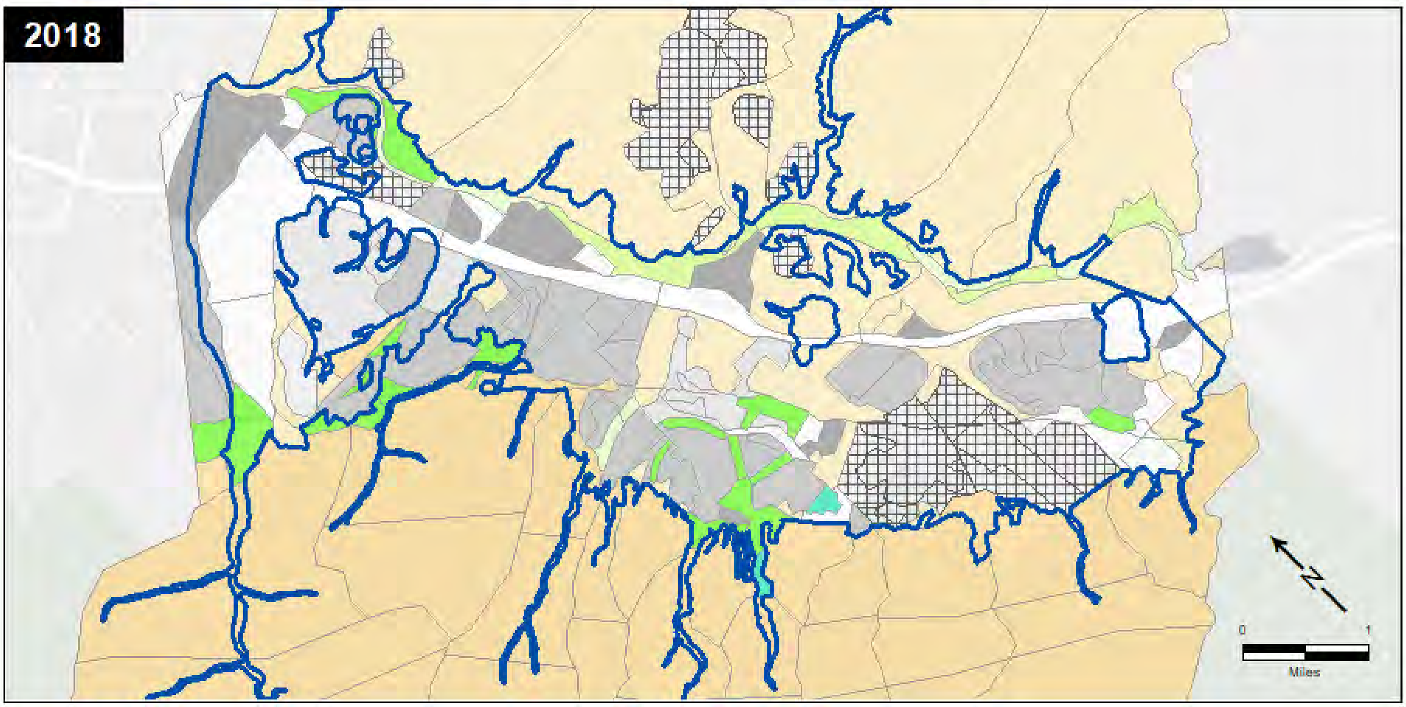

Citrus	Grassland	Industrial	Turf
Dense Riparian	Shrubs / Trees	Quarries	Residential
Sparse Riparian	Commercial	Stormwater Basins	Low Density Residential
			Vacant

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Figure 4
1990 and 2018 Land Use for Recharge Polygons

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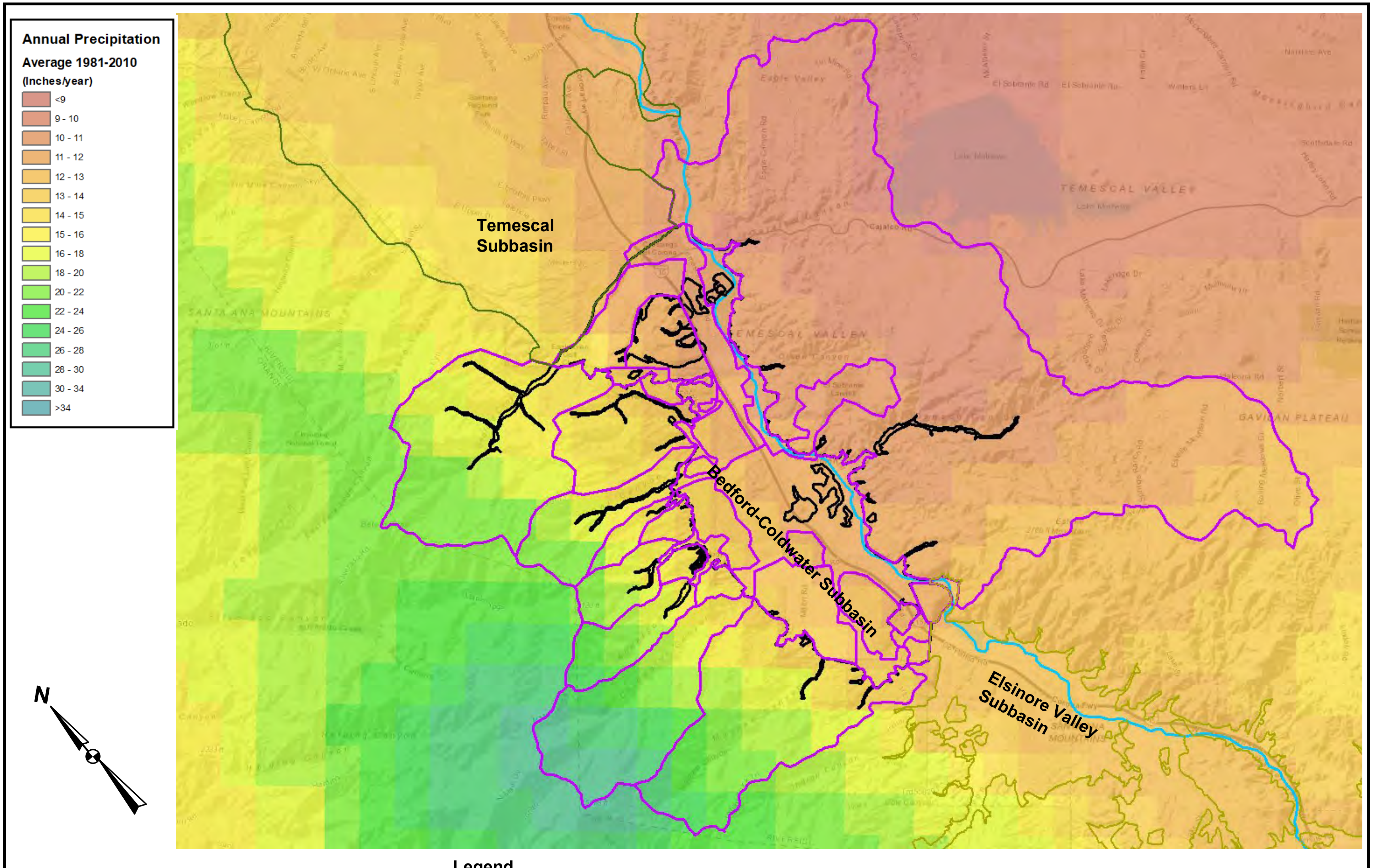

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Figure 5
Average Annual Rainfall

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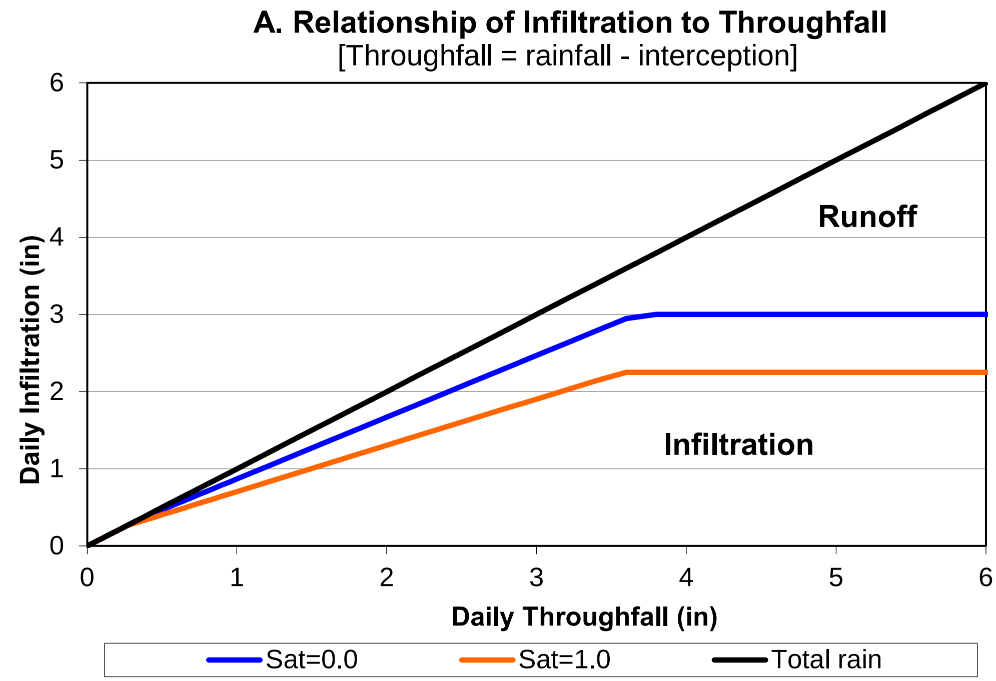

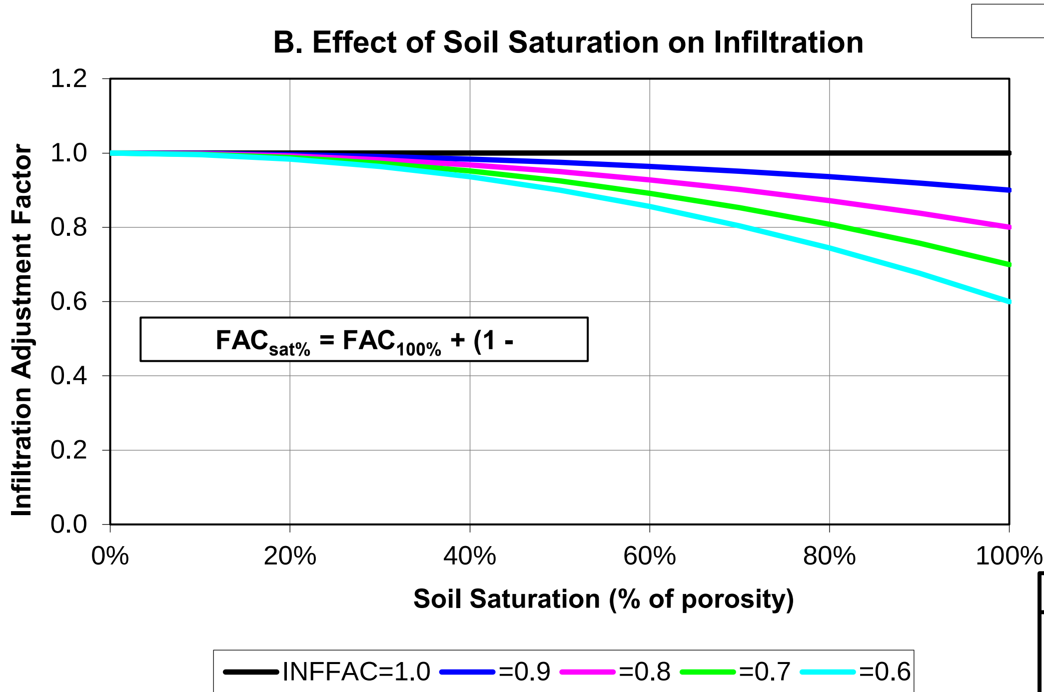

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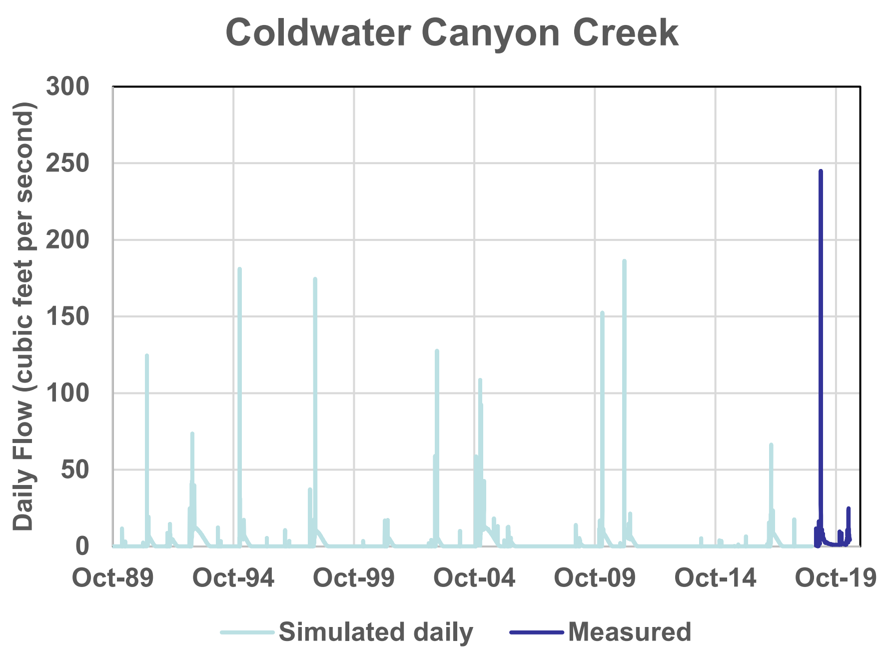
Figure 6
Relationship of Rainfall to Infiltration

DRAFT



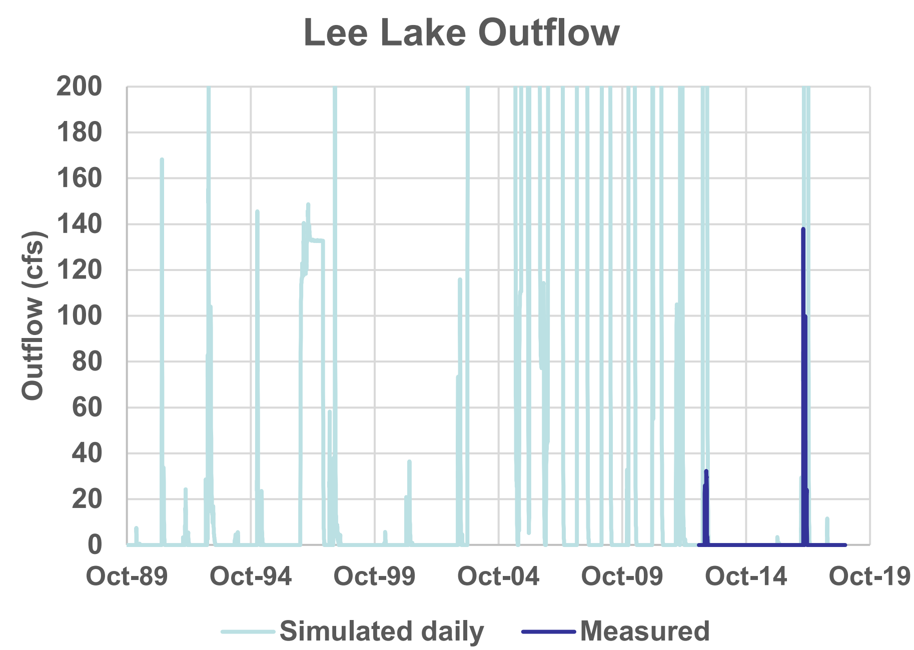


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Figure 7
Rainfall to Runoff Calibration

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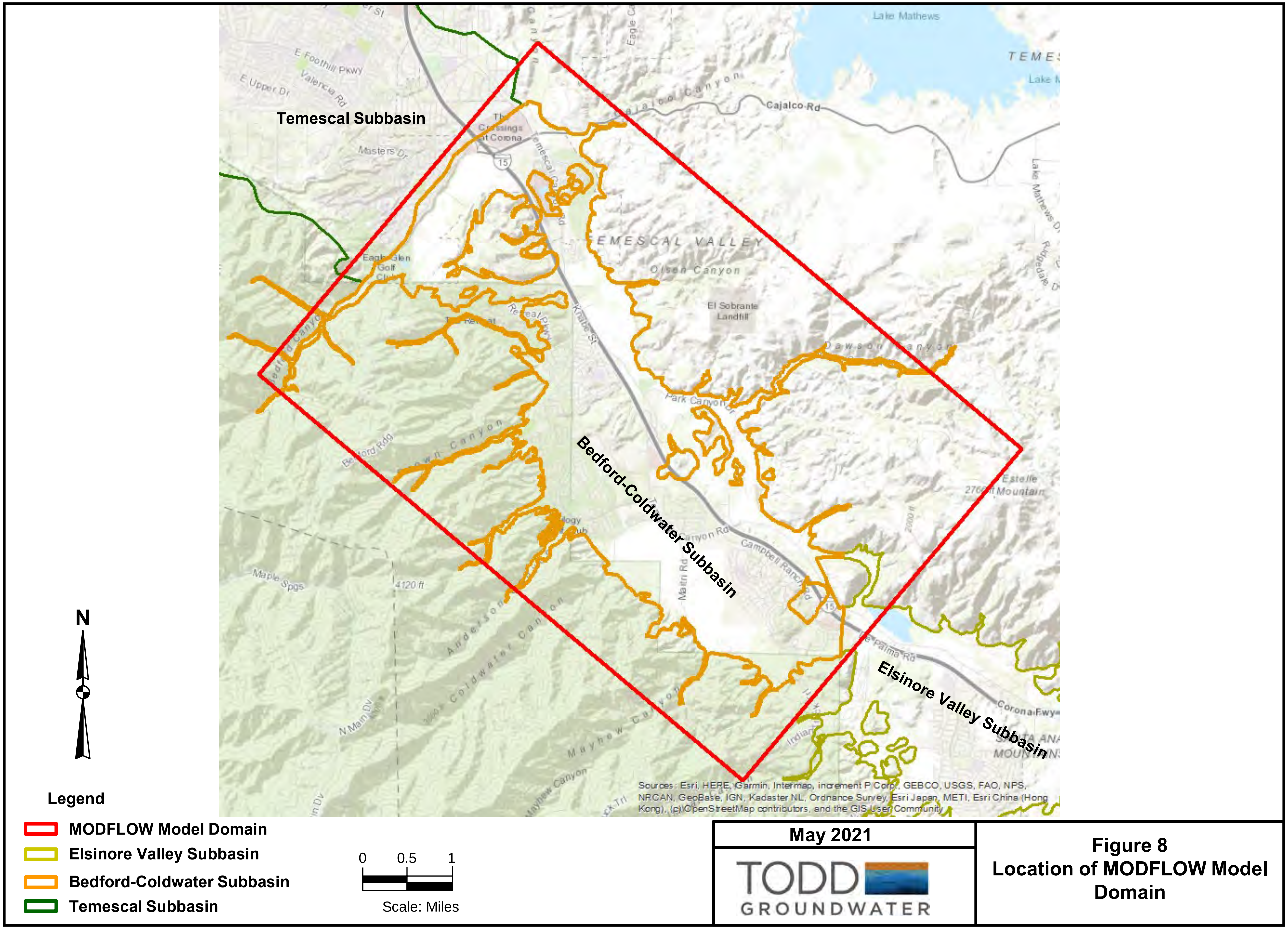

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Figure 8
Location of MODFLOW Model Domain

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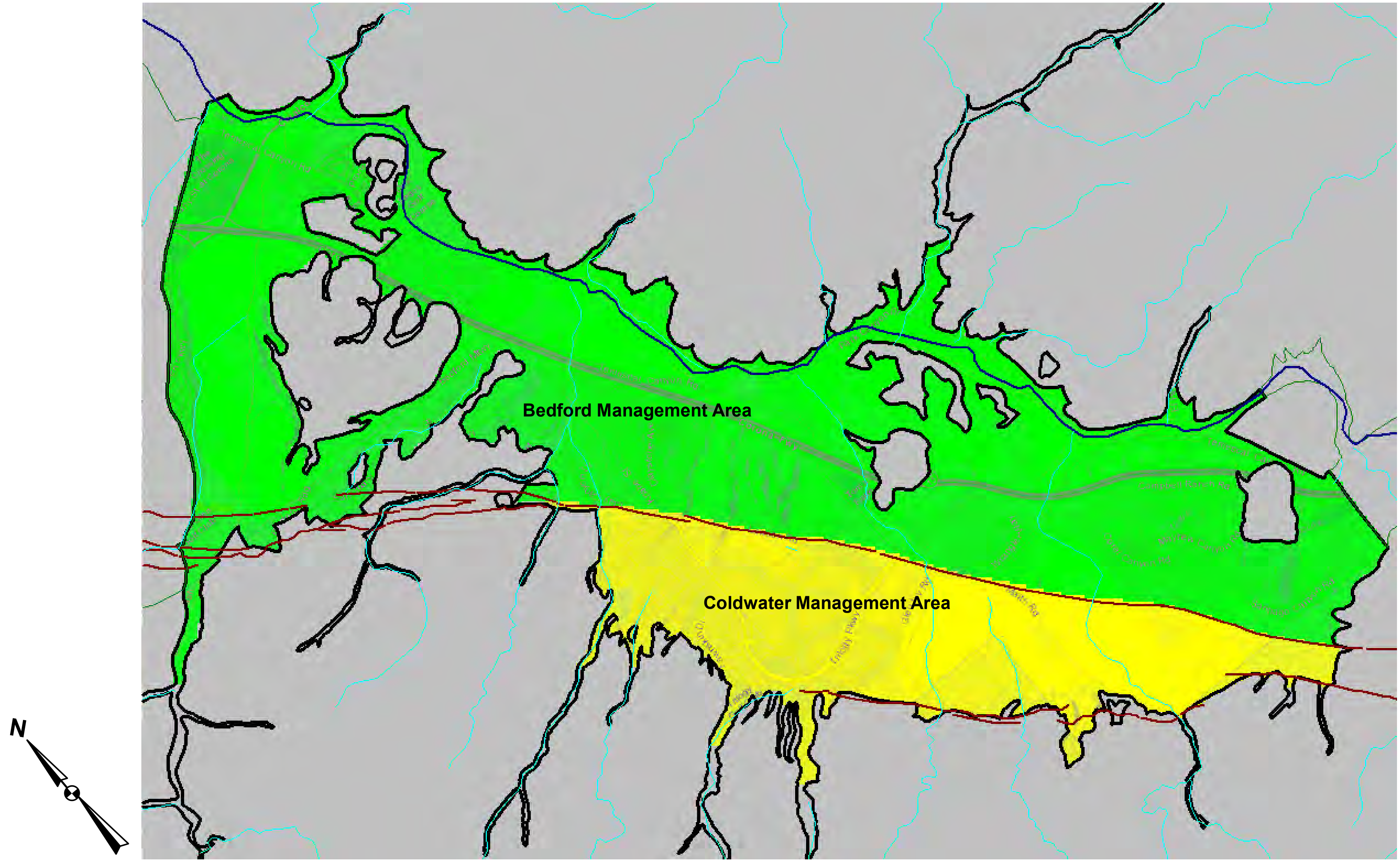

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Figure 9
Location of Management Areas

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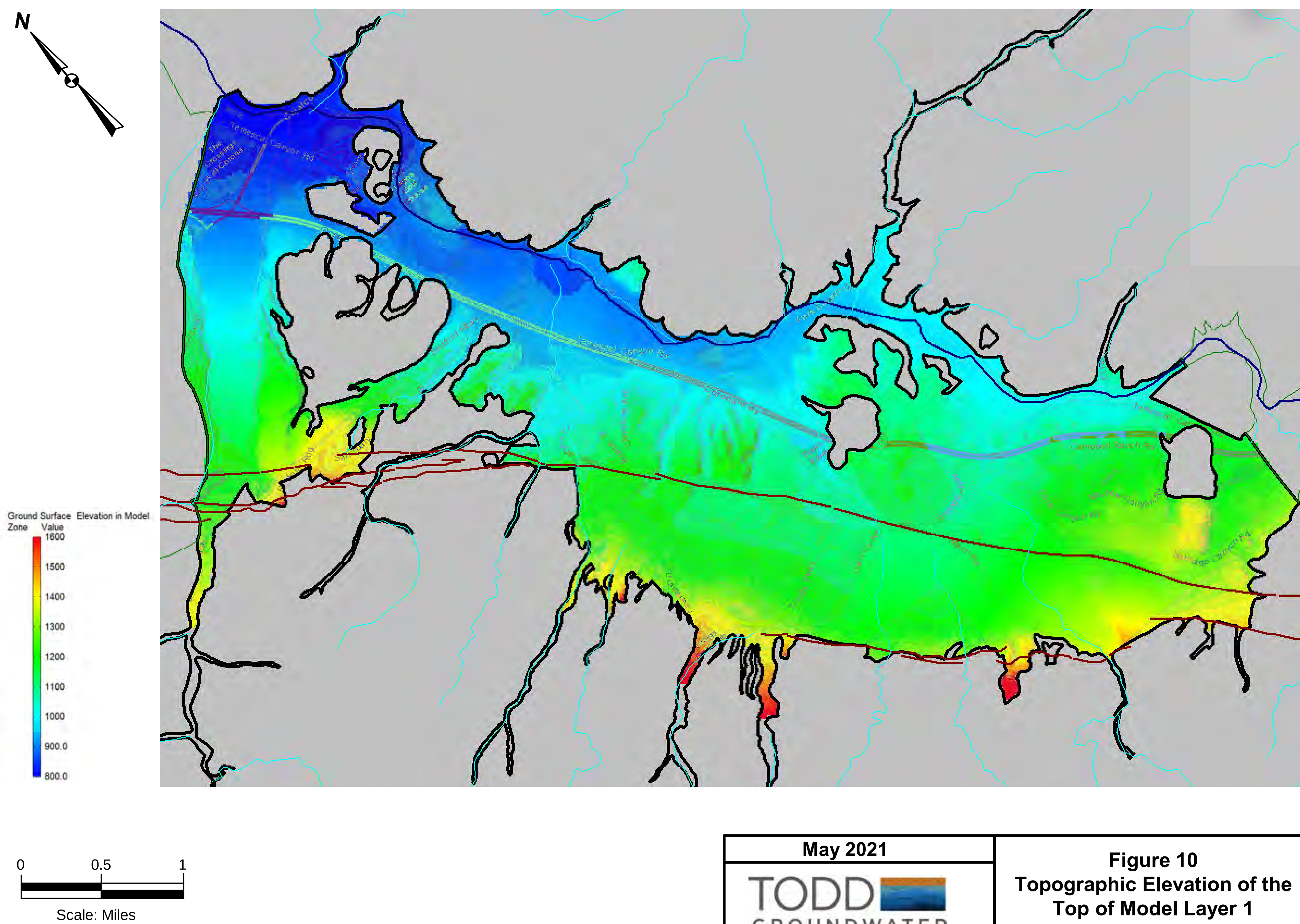

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Figure 10
Topographic Elevation of the Top of Model Layer 1

DRAFT

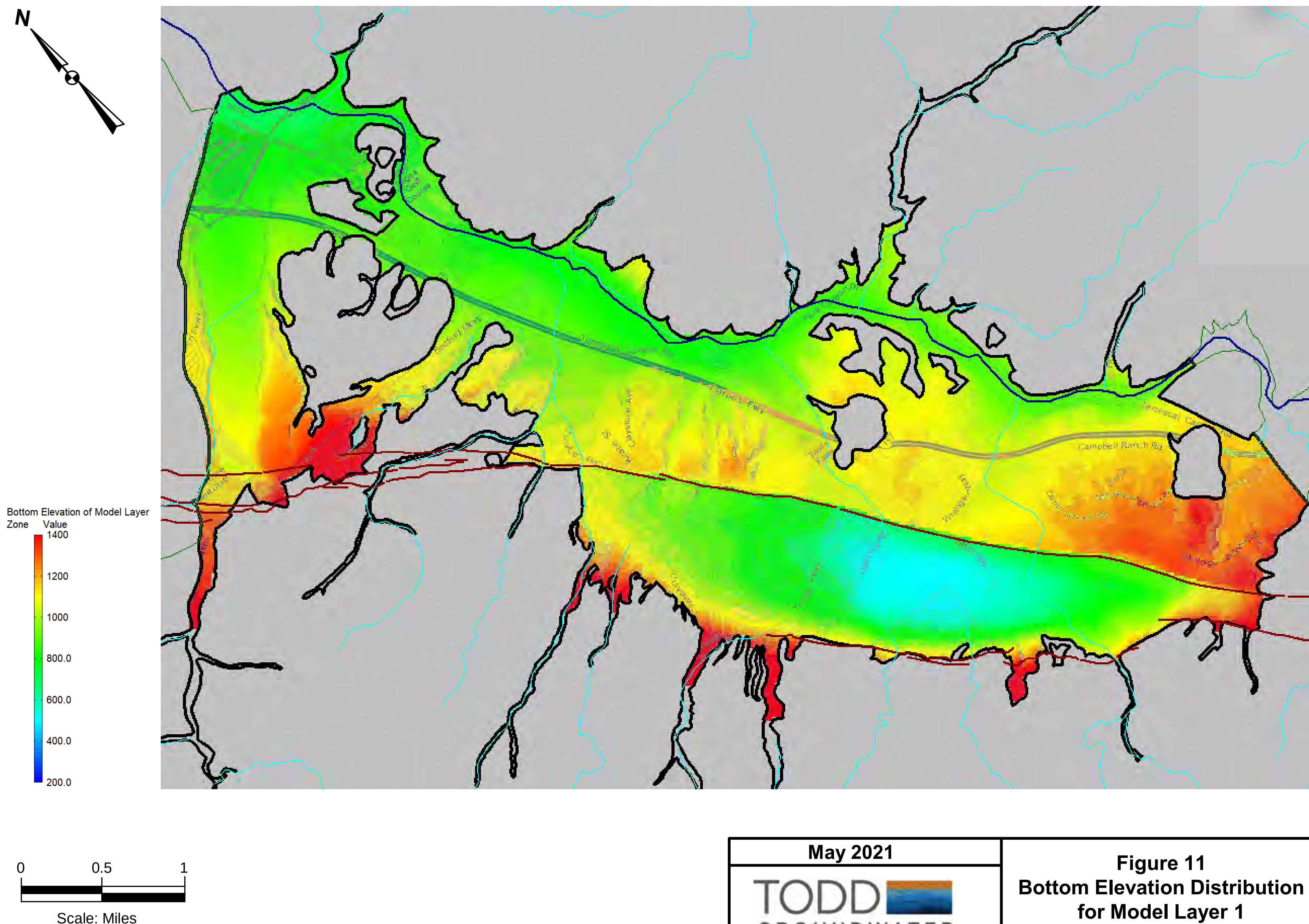

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Figure 11
Bottom Elevation Distribution for Model Layer 1

DRAFT

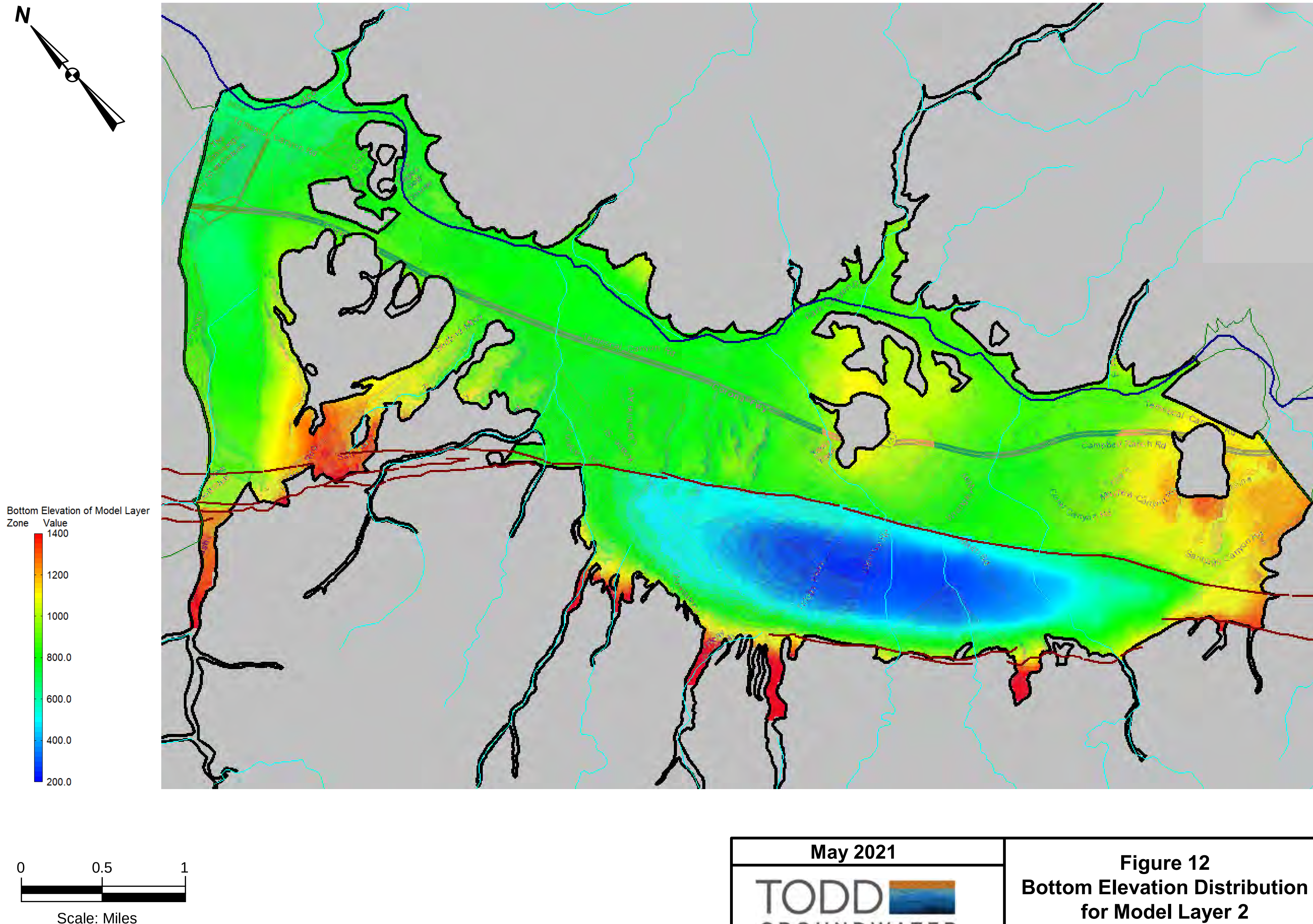

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Figure 12
Bottom Elevation Distribution for Model Layer 2

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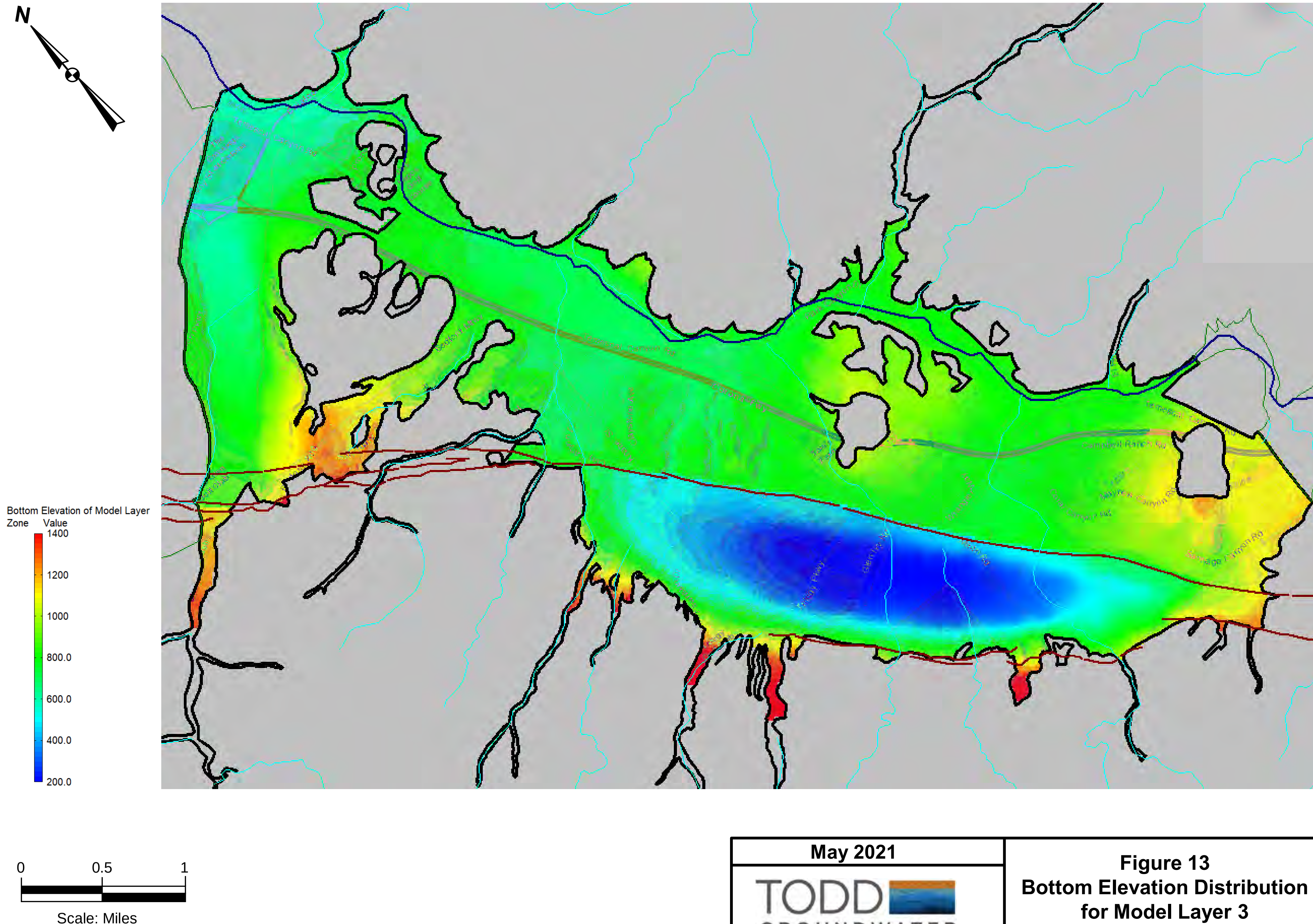

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Figure 13
Bottom Elevation Distribution for Model Layer 3

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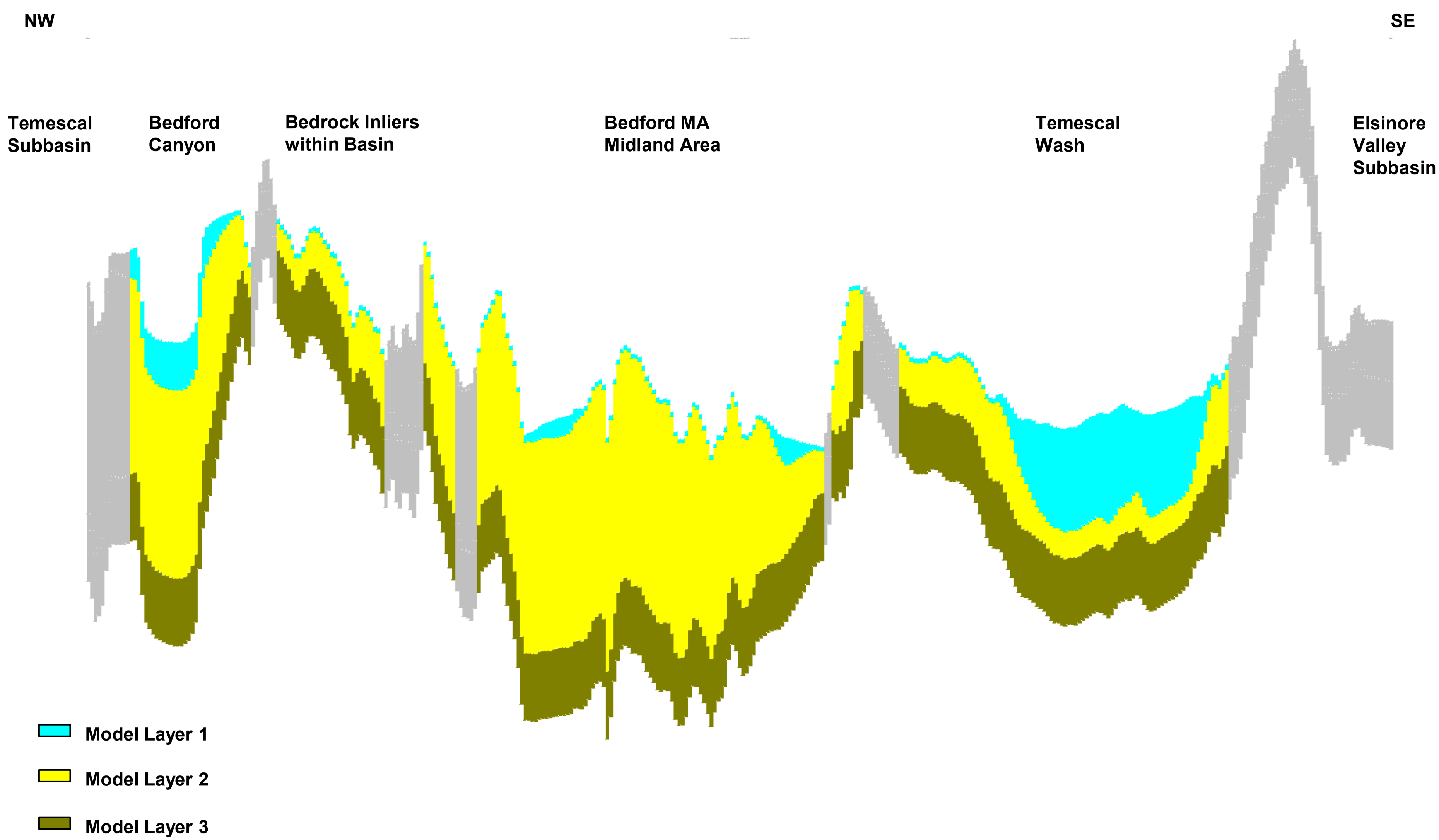

Note: Cross Section taken from MODFLOW model along row 127

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Figure 14
Schematic NW-SE Cross Section to Illustrate Relative Model Layer Thicknesses

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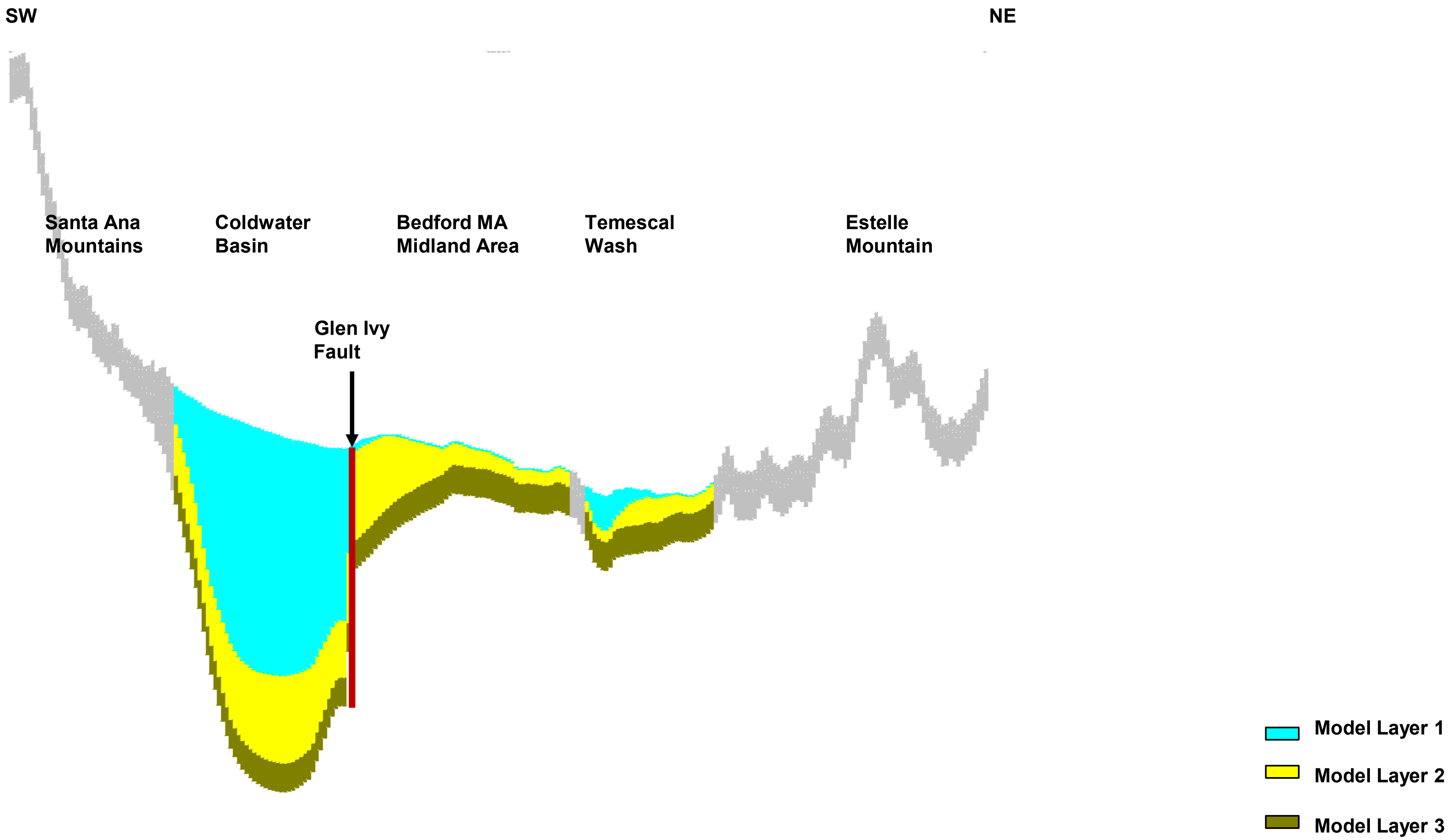

Note: Cross Section taken from MODFLOW model along column 230

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Figure 15
Schematic NE-SW Cross Section to Illustrate Relative Model Layer Thicknesses

DRAFT

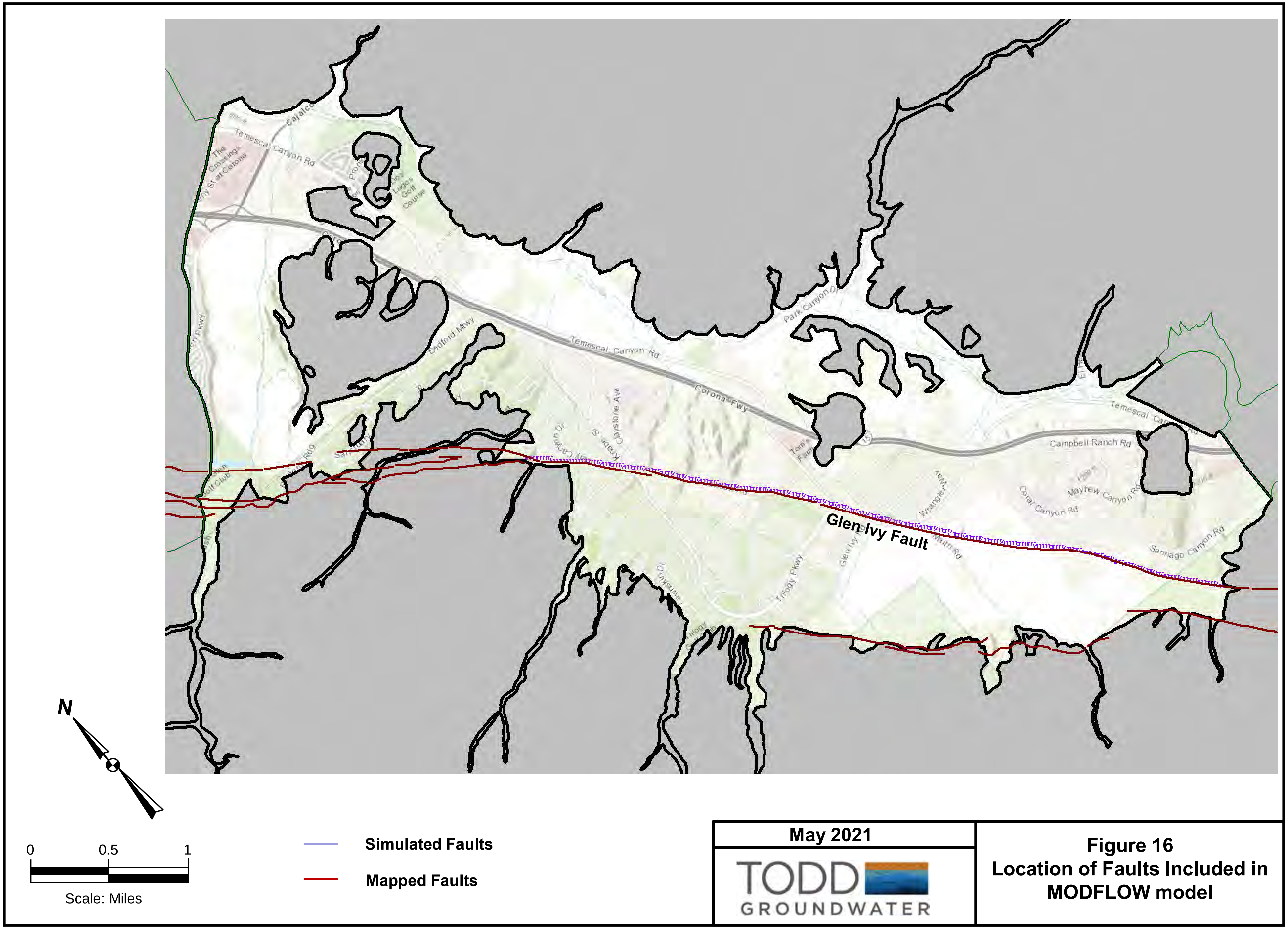

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Figure 16
Location of Faults Included in MODFLOW model

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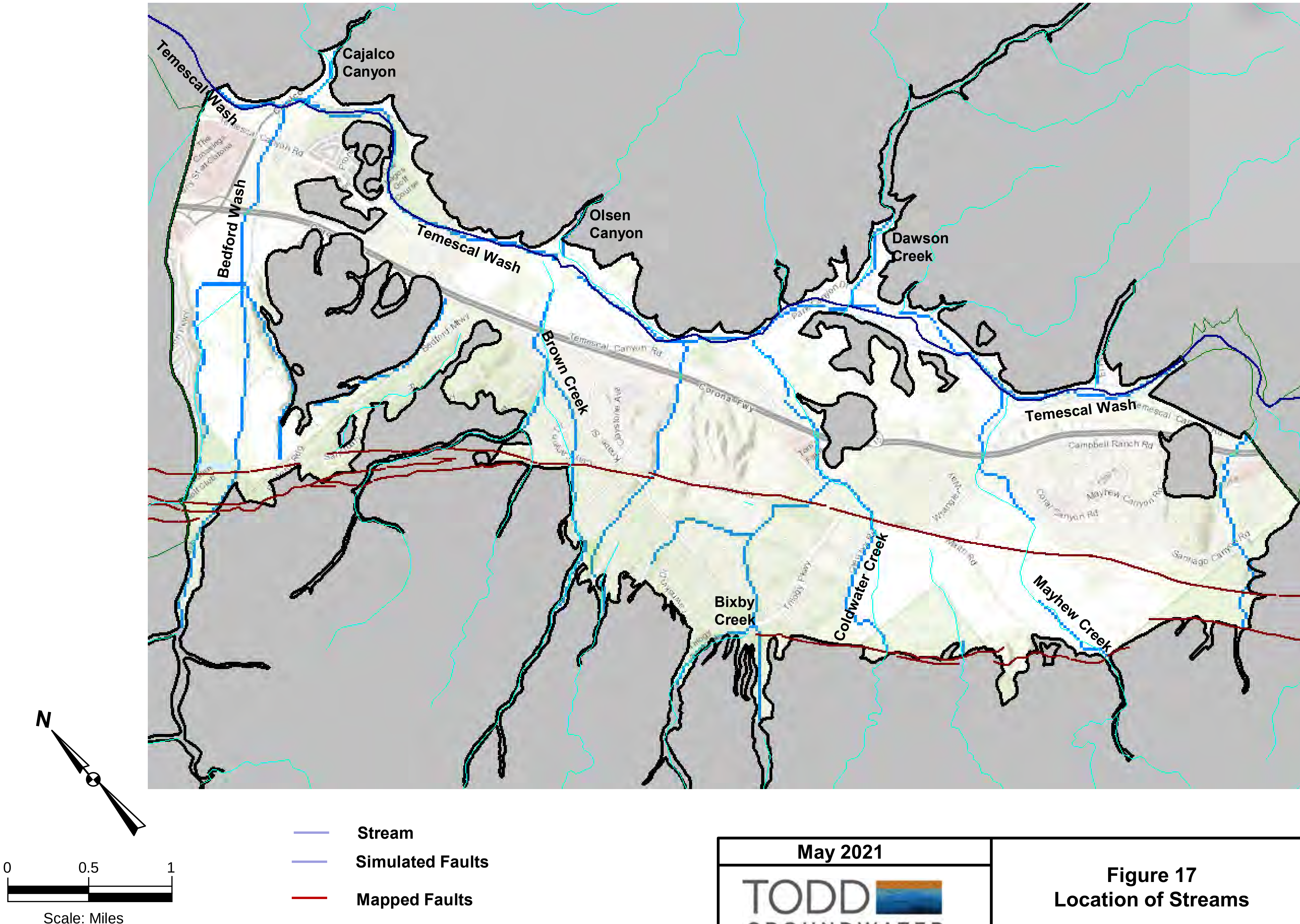

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Figure 17
Location of Streams

DRAFT

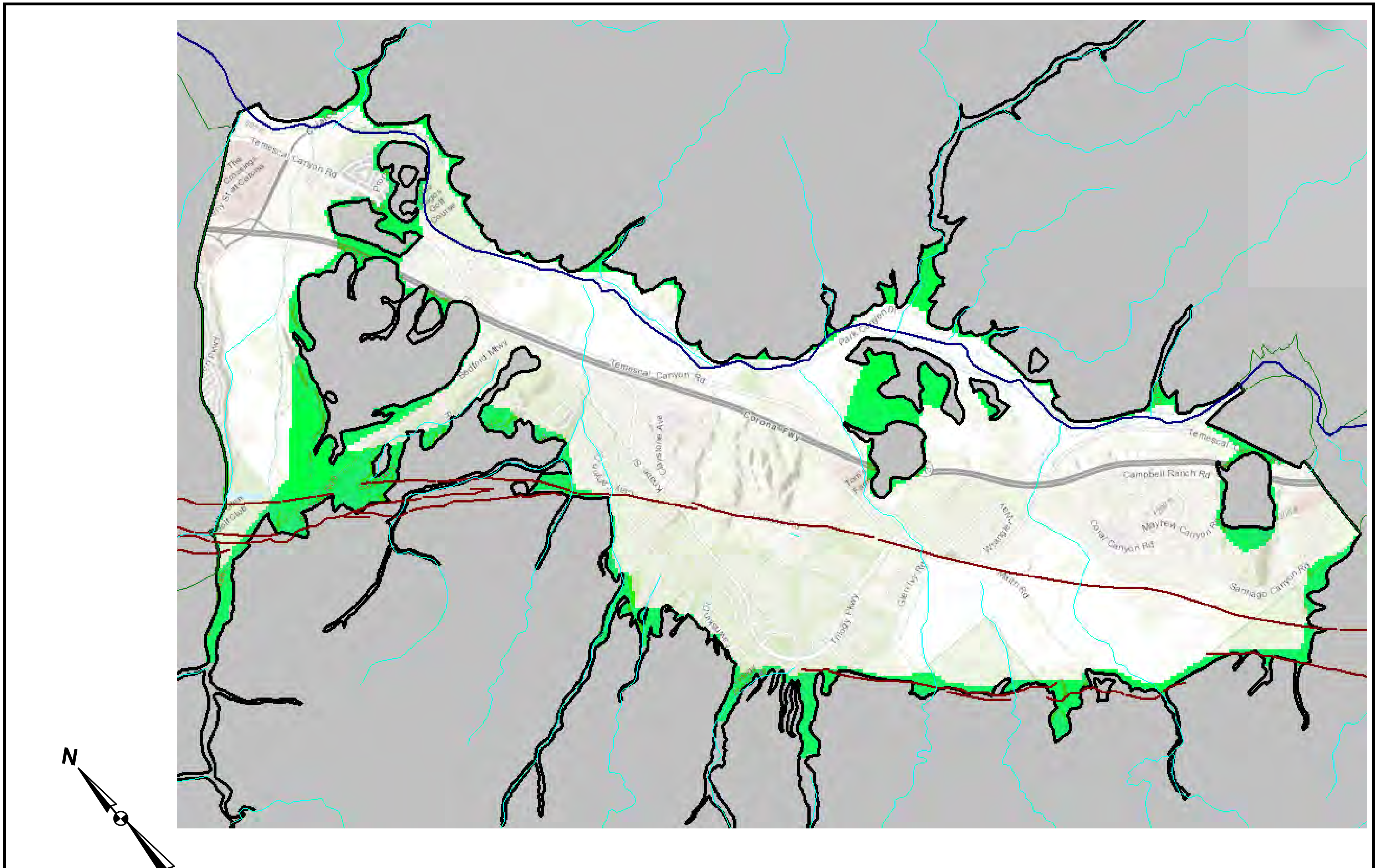

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Figure 18
Distribution of General Head Boundary Used for Mountain Front Recharge

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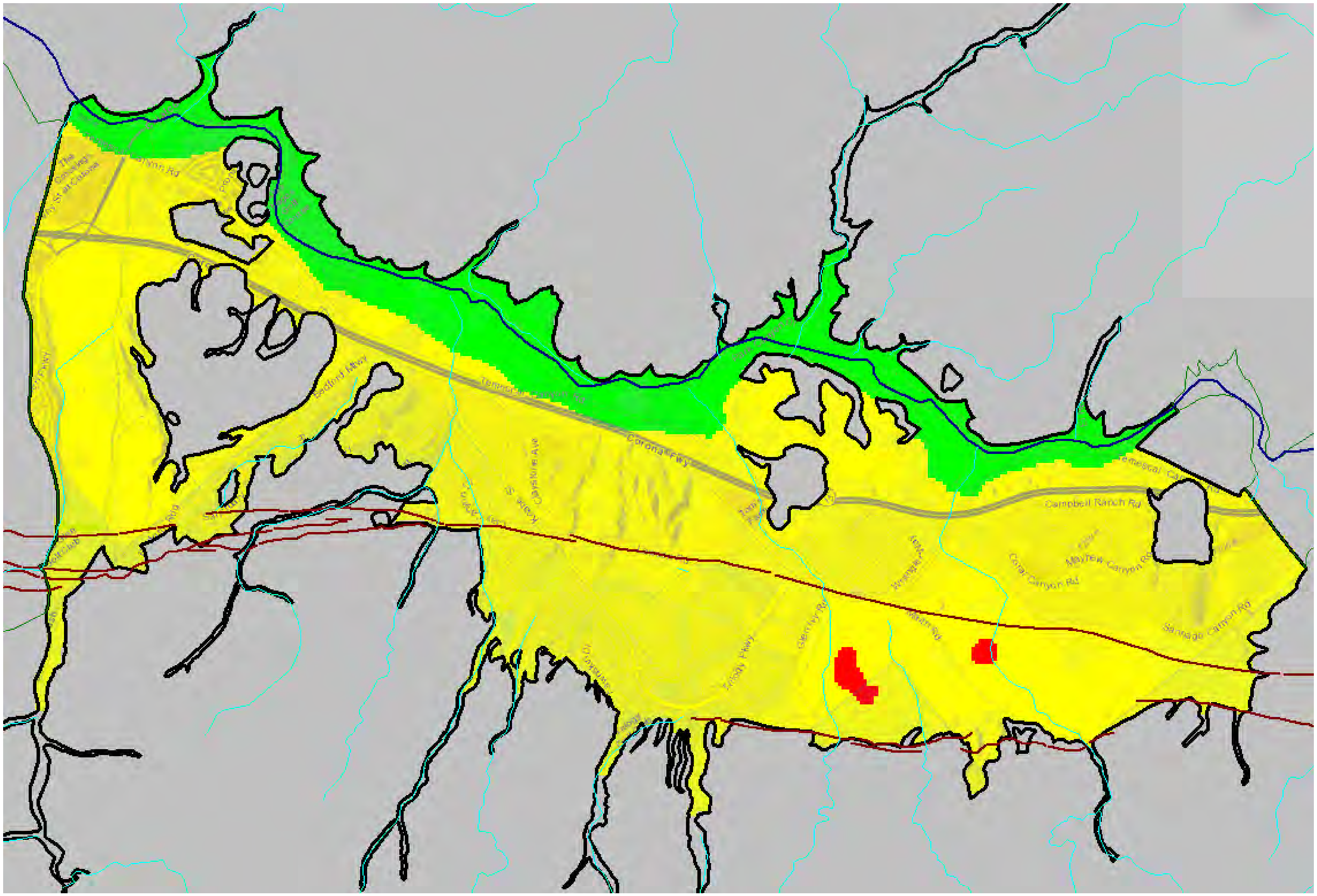

N

0 0.5 1

Scale: Miles

ET Zone 1 – 7.5 ft extinction depth

ET Zone 2 – 15 ft extinction depth

ET Zone 3 – 3 ft extinction depth

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Figure 19
Distribution of Evapotranspiration (ET) Zones

DRAFT

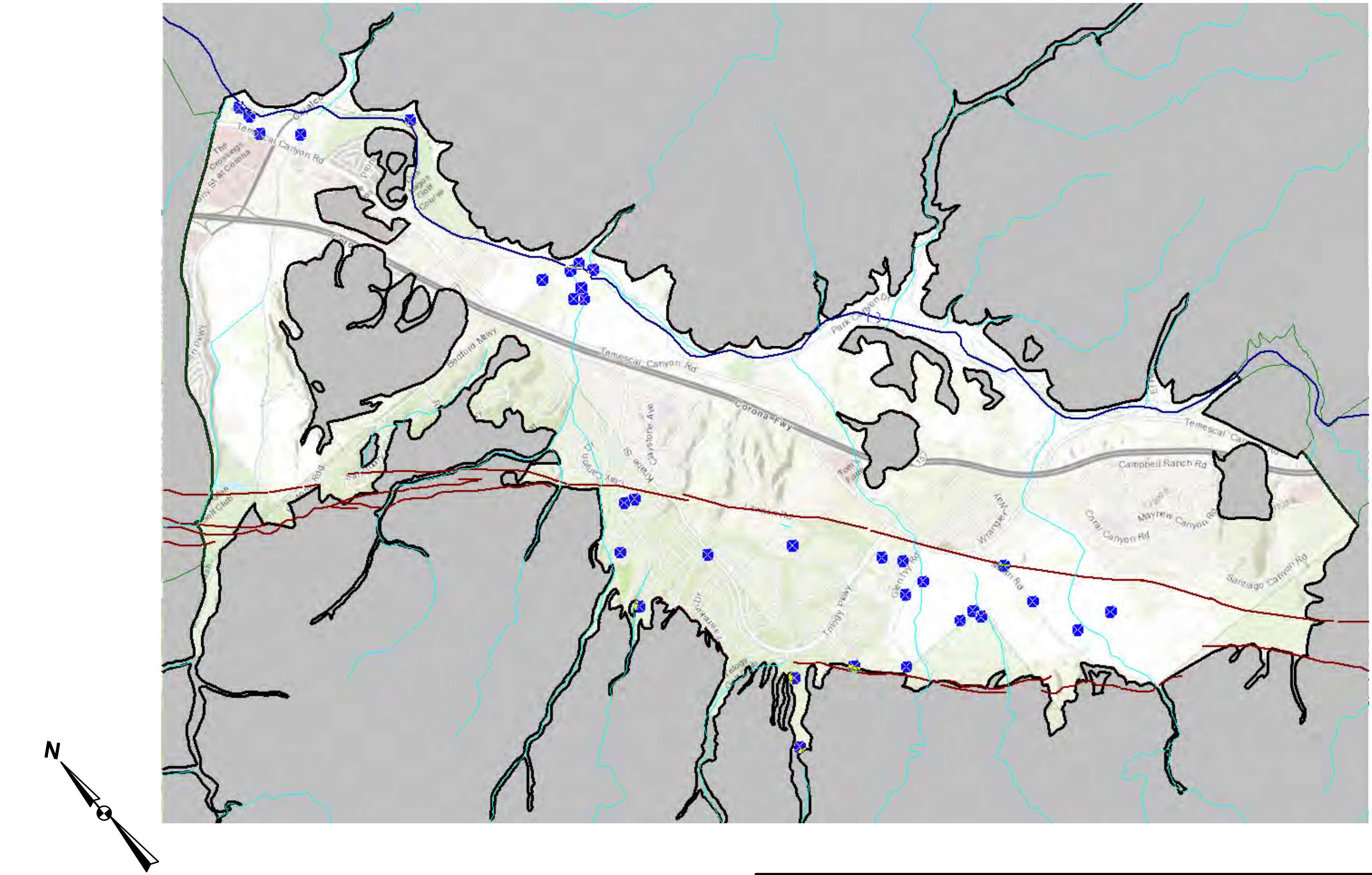

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Figure 20
Location of Pumping Wells With Measured Pumping Rates

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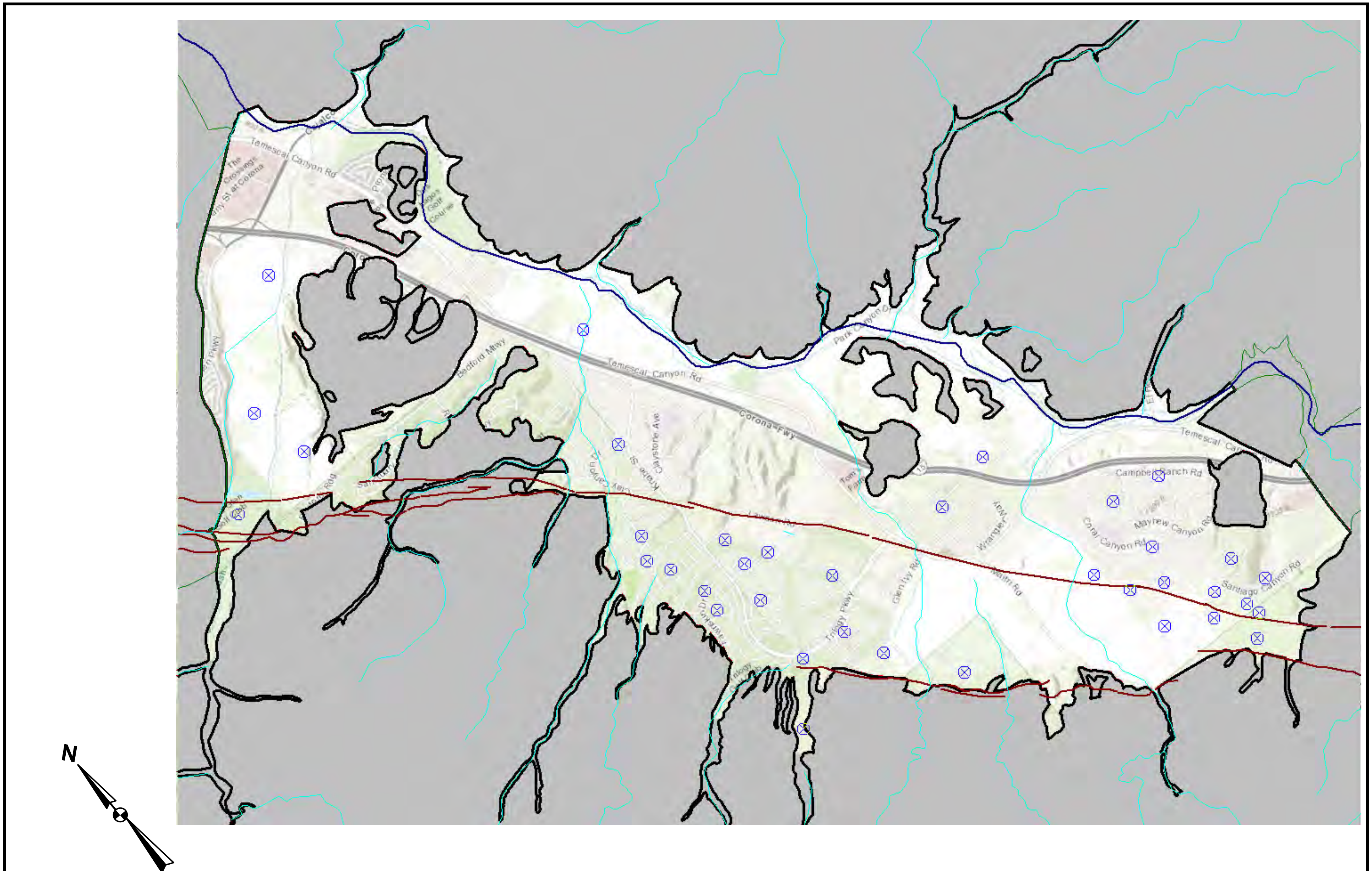

Location of Estimated Agricultural Pumping

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Figure 21
Locations of Estimated Pumping for Historical Agriculture

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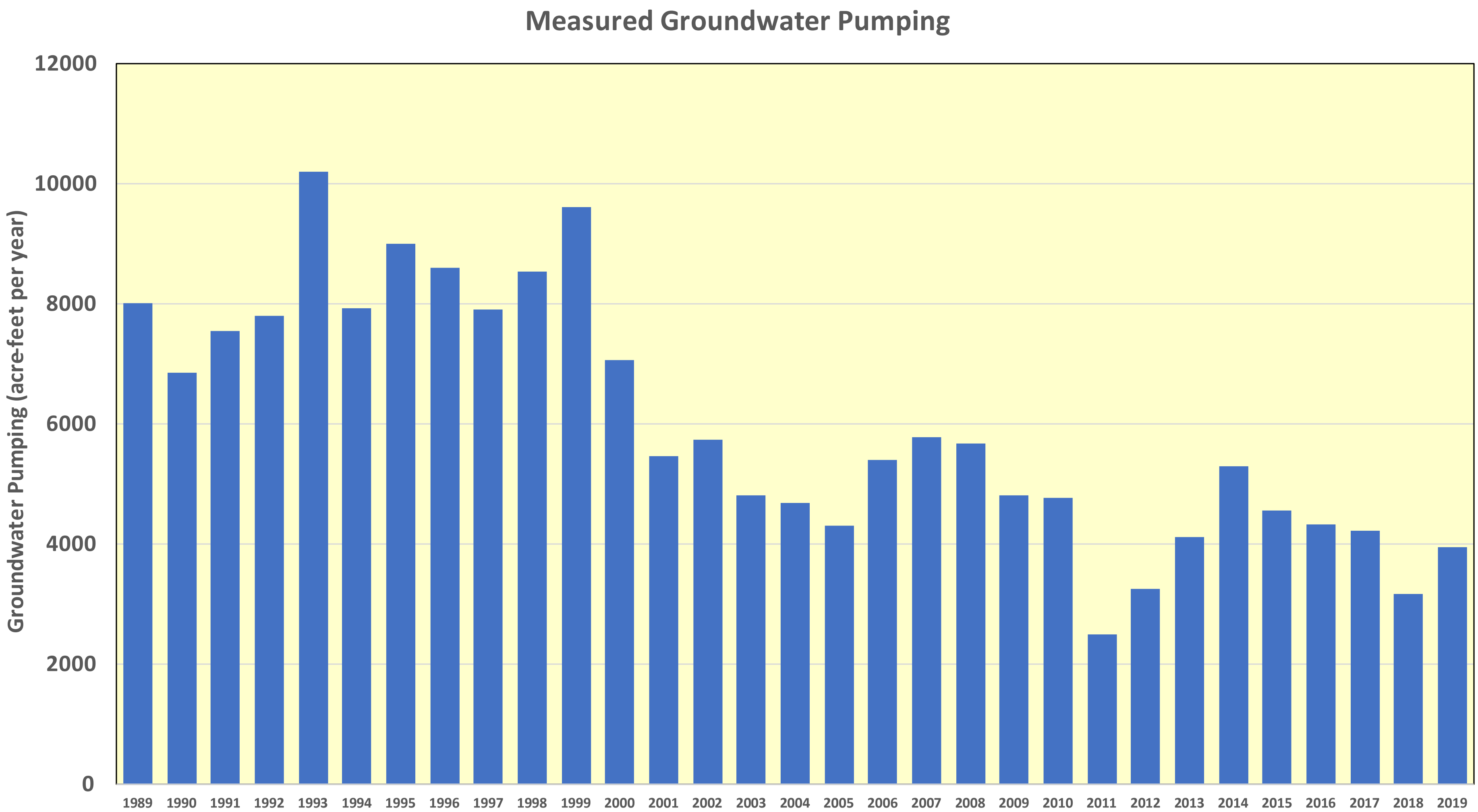

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Figure 22
Annual Groundwater Pumping in Bedford-Coldwater Basin

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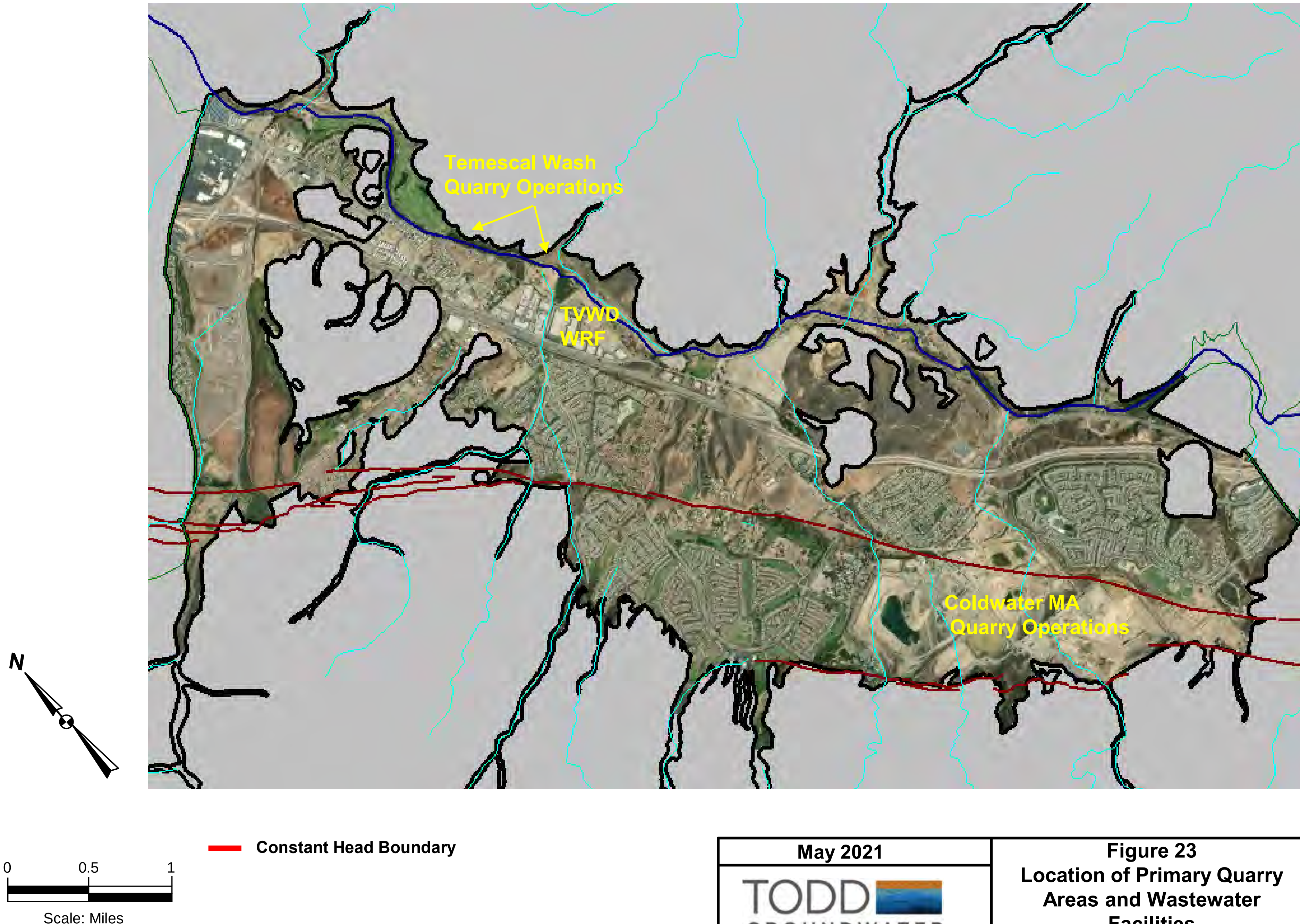

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Figure 23
Location of Primary Quarry Areas and Wastewater Facilities

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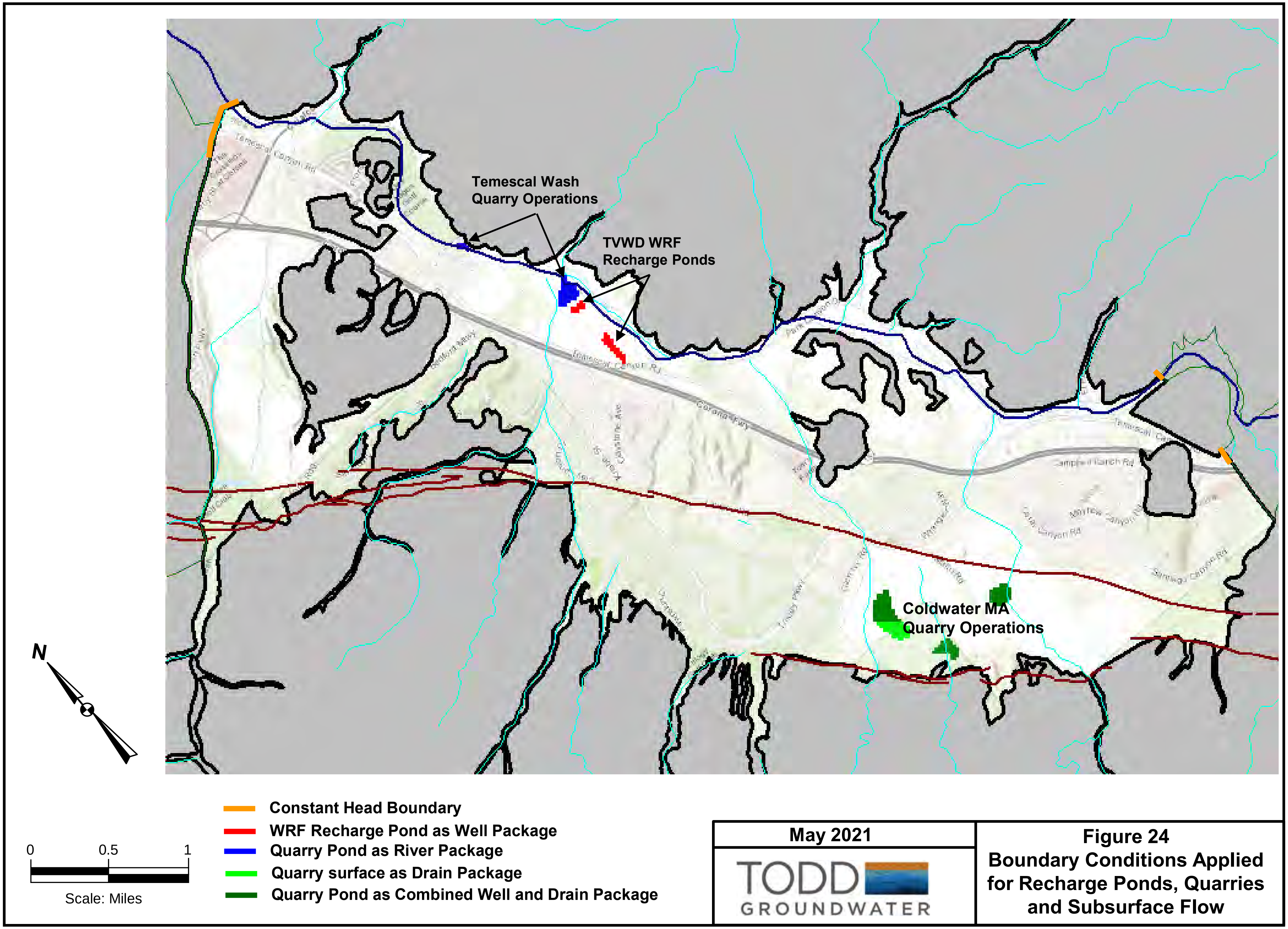

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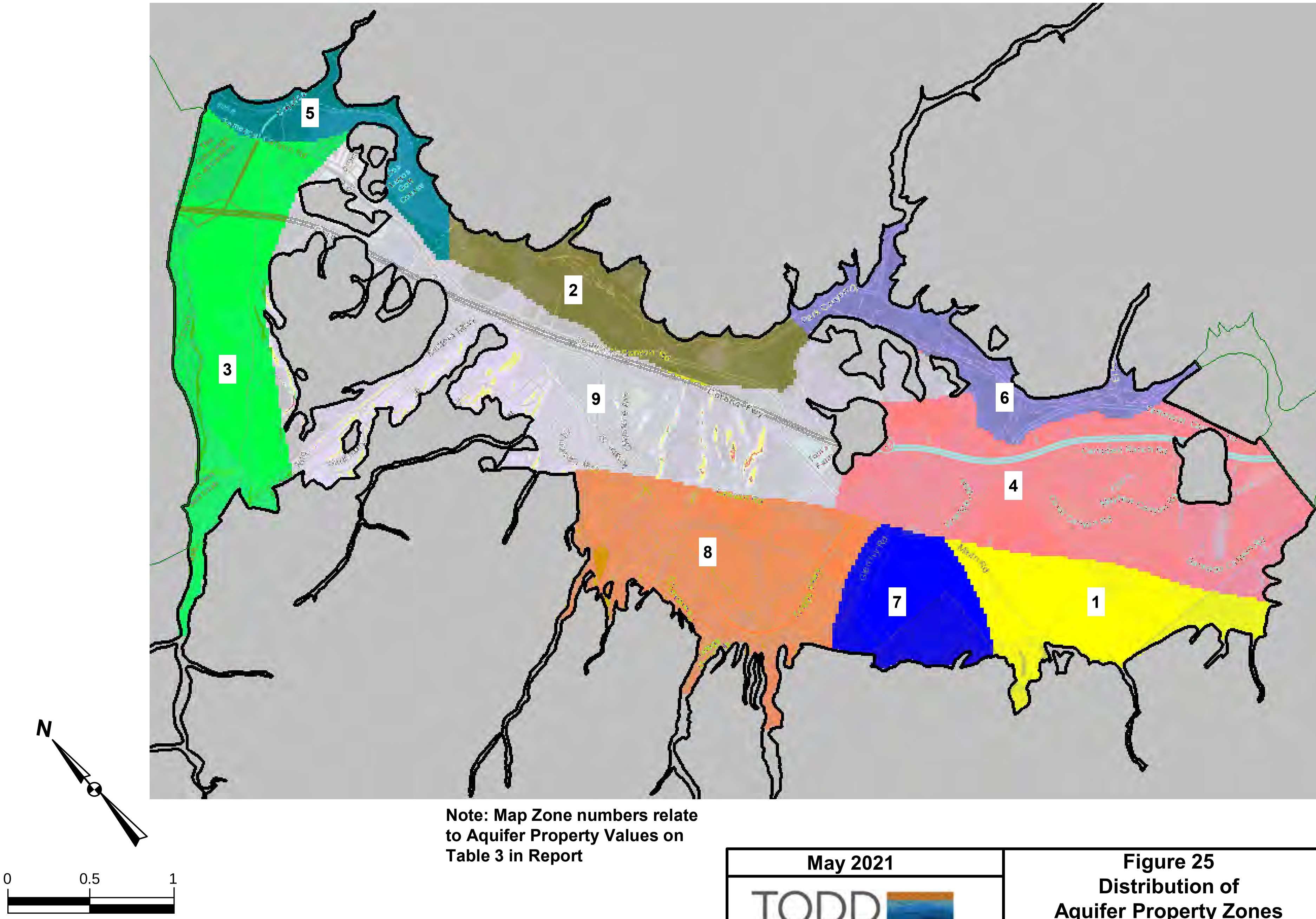
Figure 24
Boundary Conditions Applied for Recharge Ponds, Quarries and Subsurface Flow

DRAFT



Note: Map Zone numbers relate to Aquifer Property Values on Table 3 in Report

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Figure 25
Distribution of Aquifer Property Zones for Layers 1, 2 and 3

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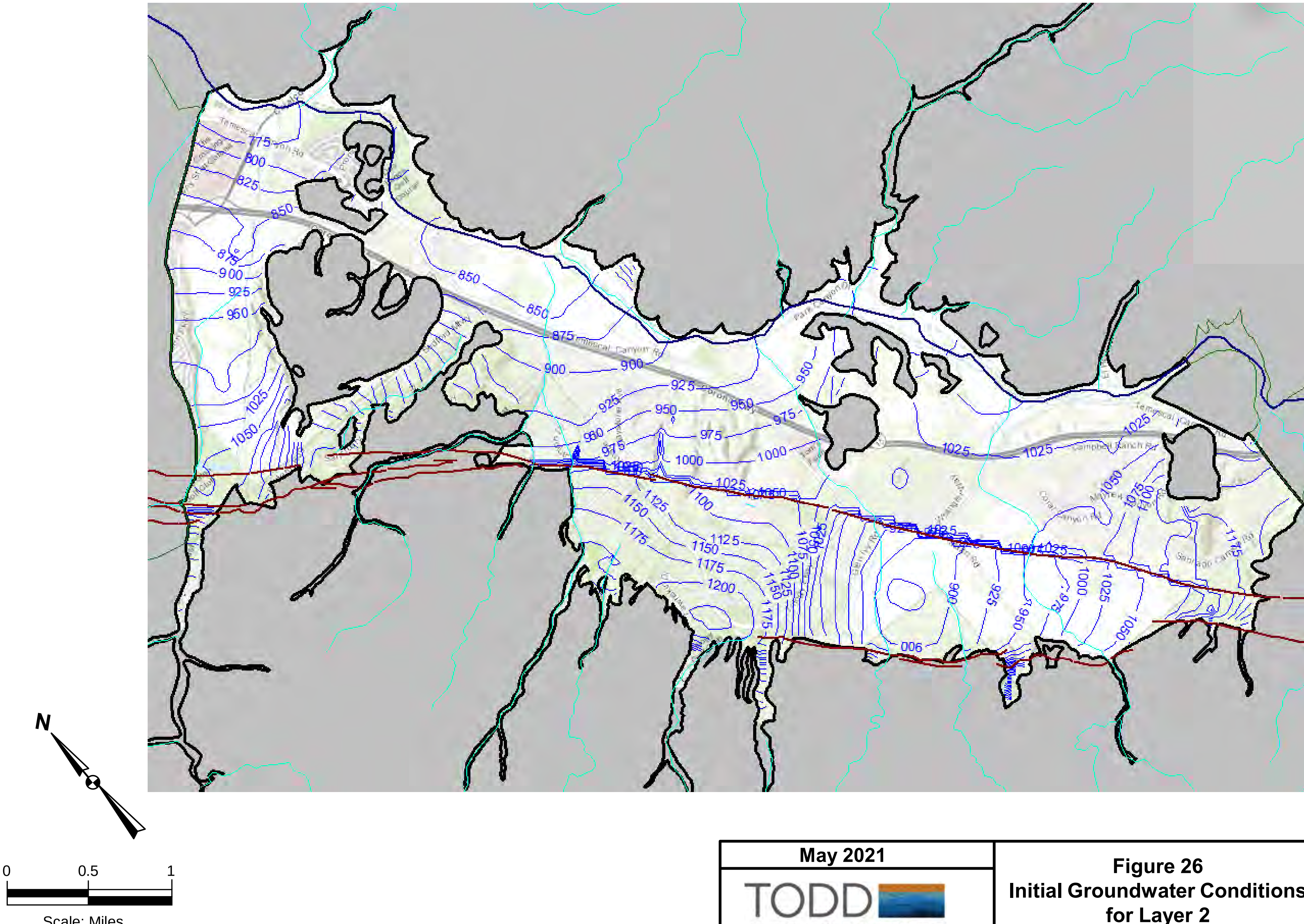

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Figure 26
Initial Groundwater Conditions for Layer 2

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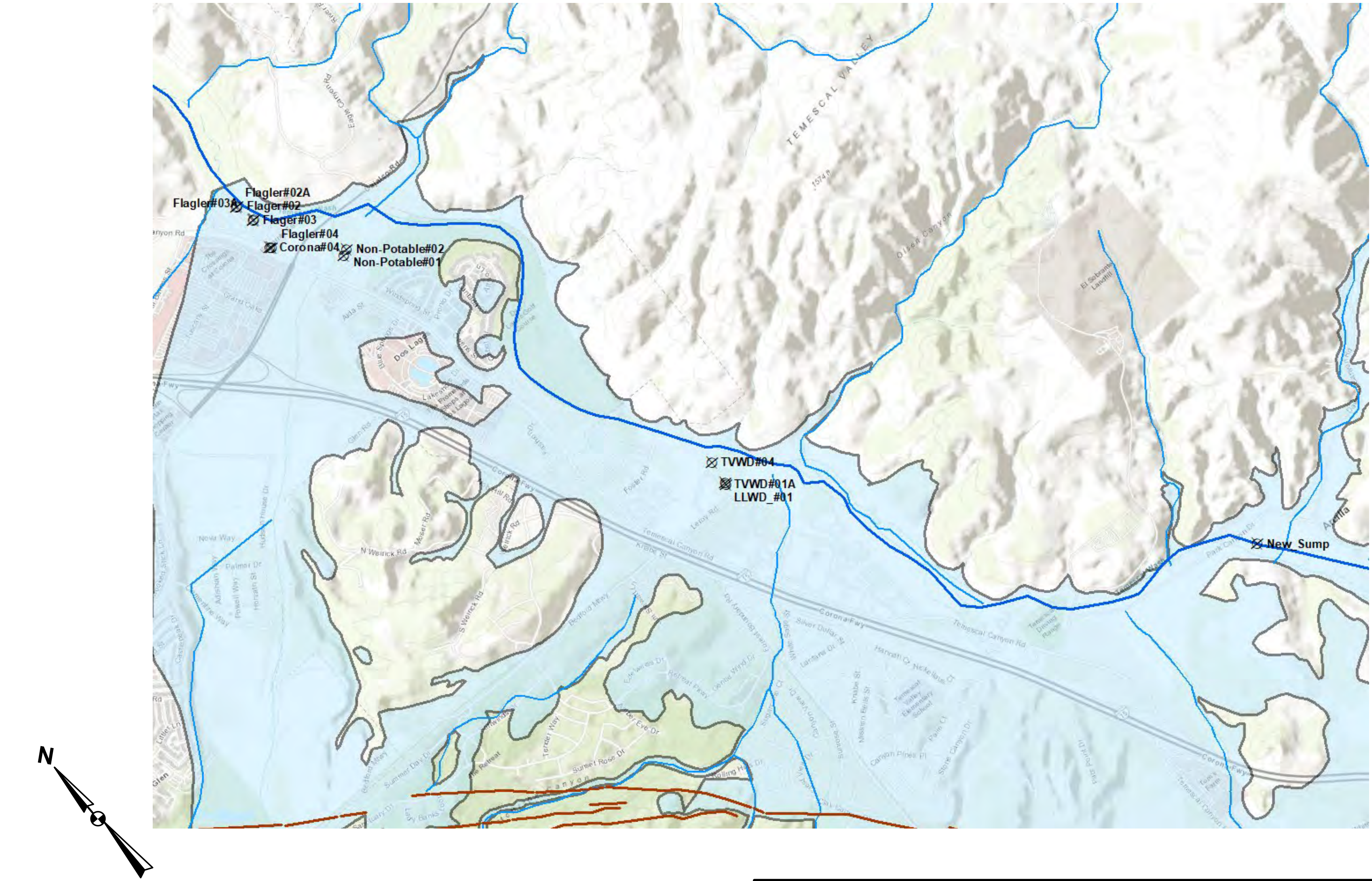

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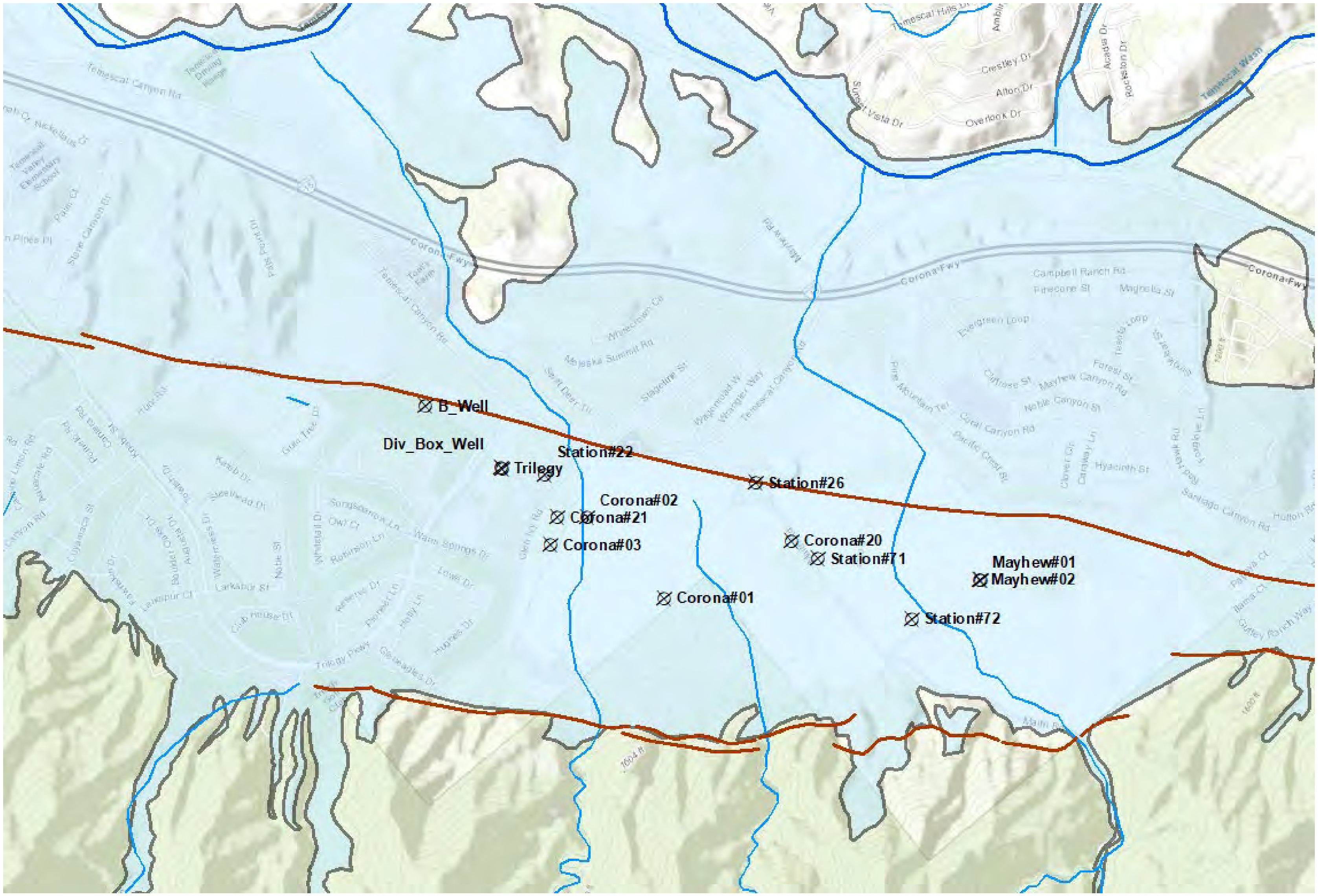
Figure 27
Location of Monitoring Wells Used for Model Calibration in Bedford MA

DRAFT



N

0 0.5 1

Scale: Miles

Corona#01

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TODD GROUNDWATER

Figure 28
Location of Monitoring Wells Used for Model Calibration in Coldwater MA

DRAFT

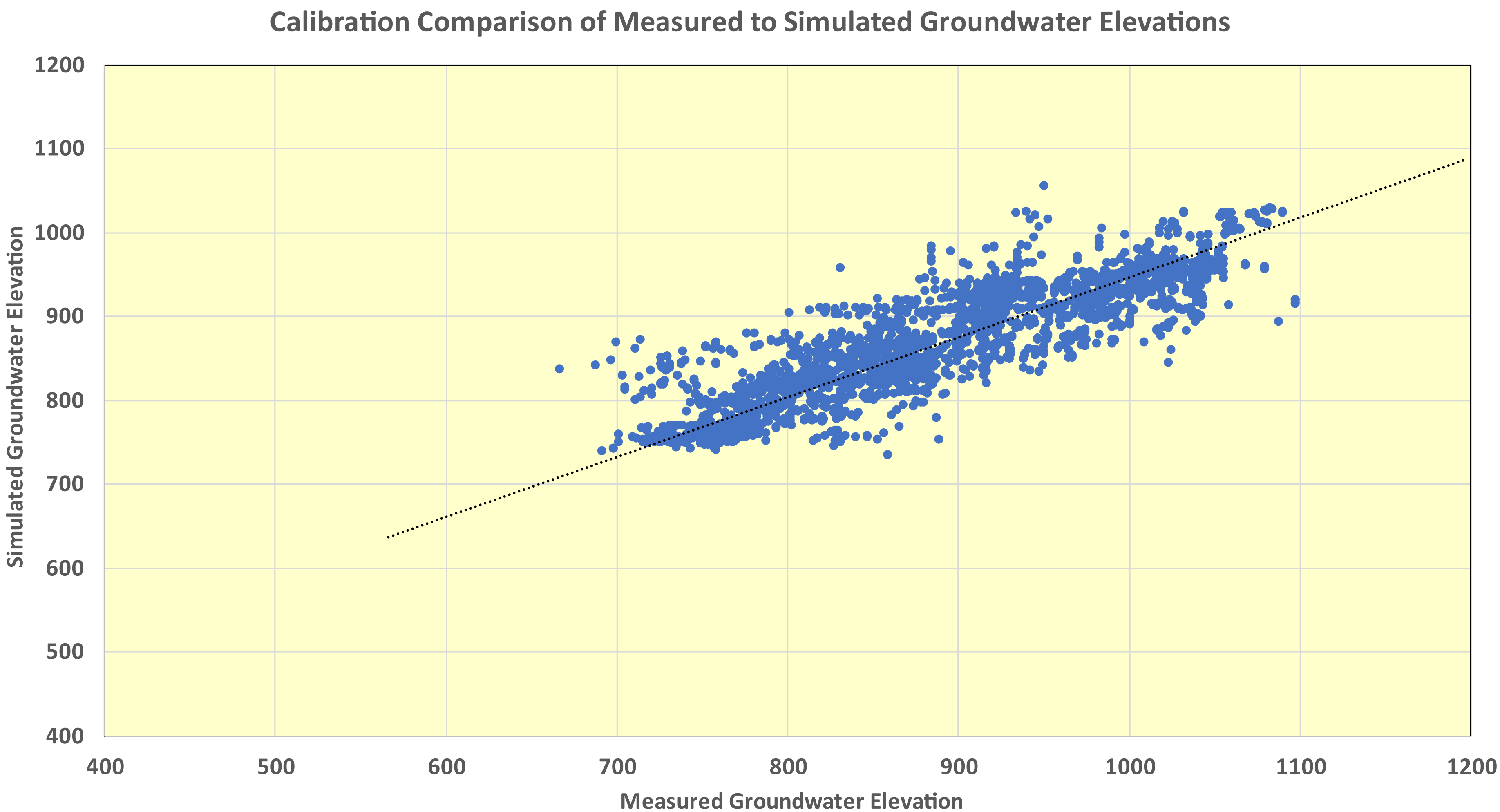

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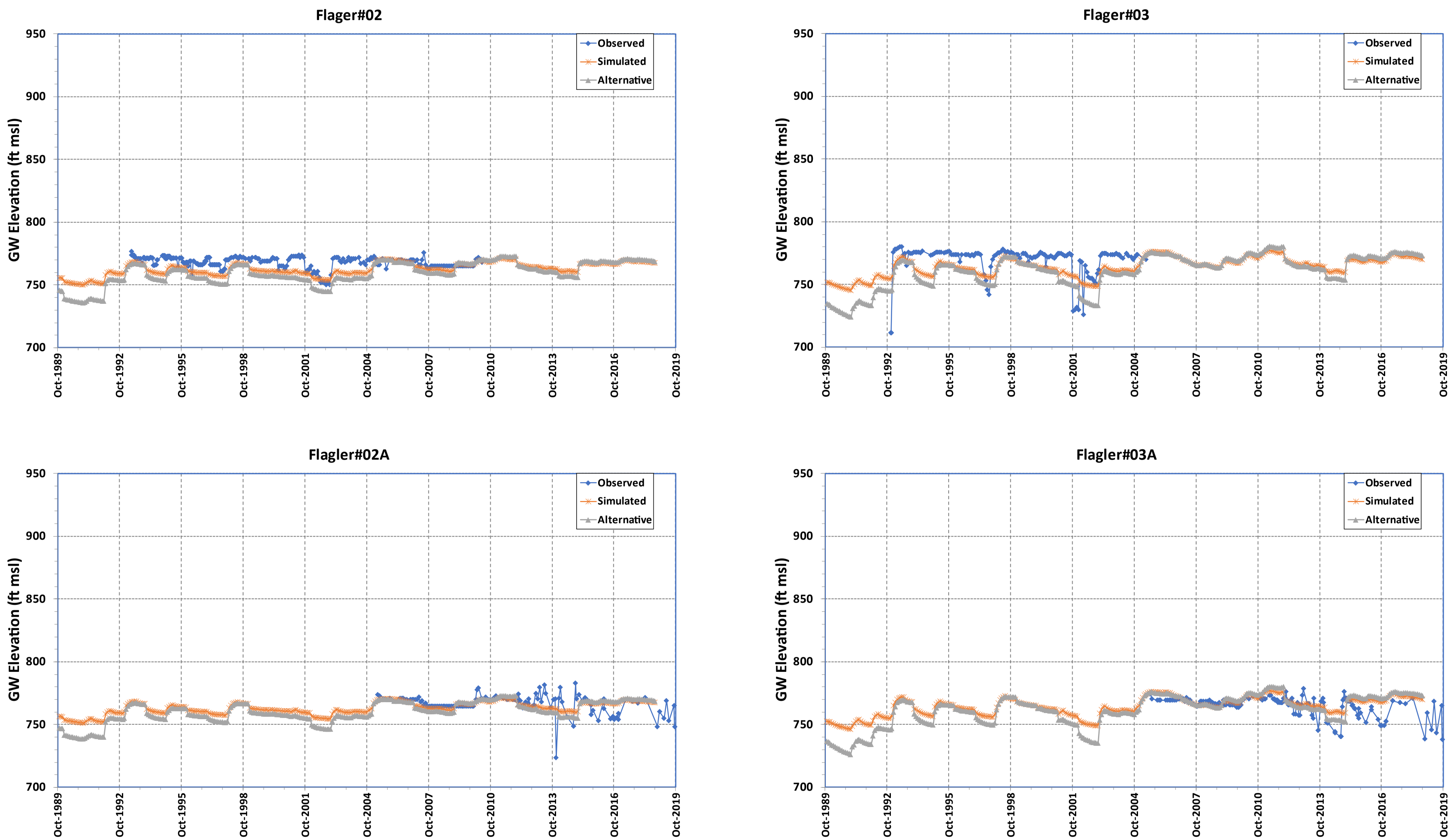
Figure 29
Scatter Plot Comparing Simulated to Measured Groundwater Levels

DRAFT



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TODD GROUNDWATER

Figure 30
Calibration Hydrographs
Bedford MA
North Temescal Wash Area

DRAFT

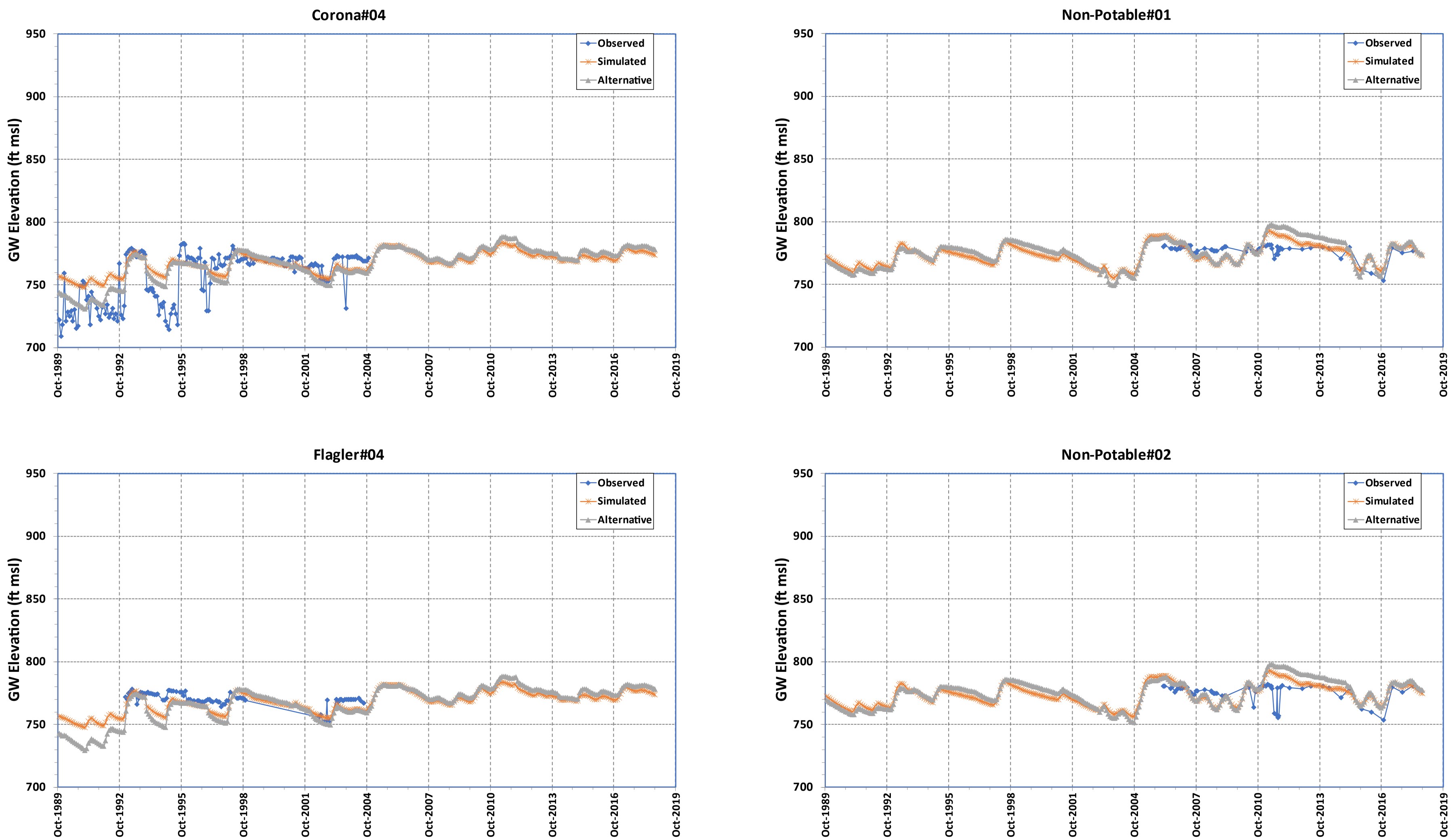

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Figure 31
Calibration Hydrographs
Bedford MA
North Temescal Wash Area

DRAFT

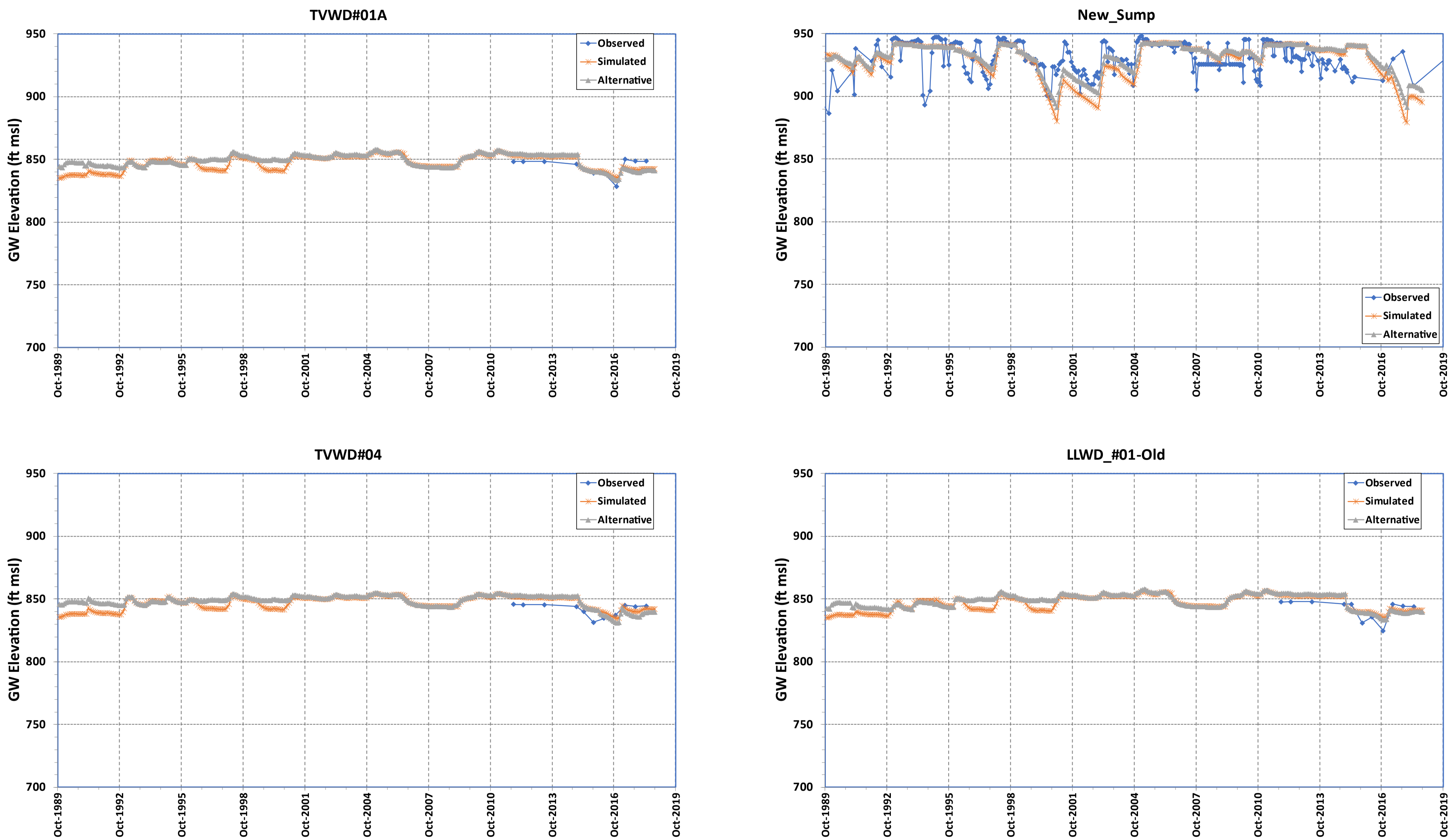

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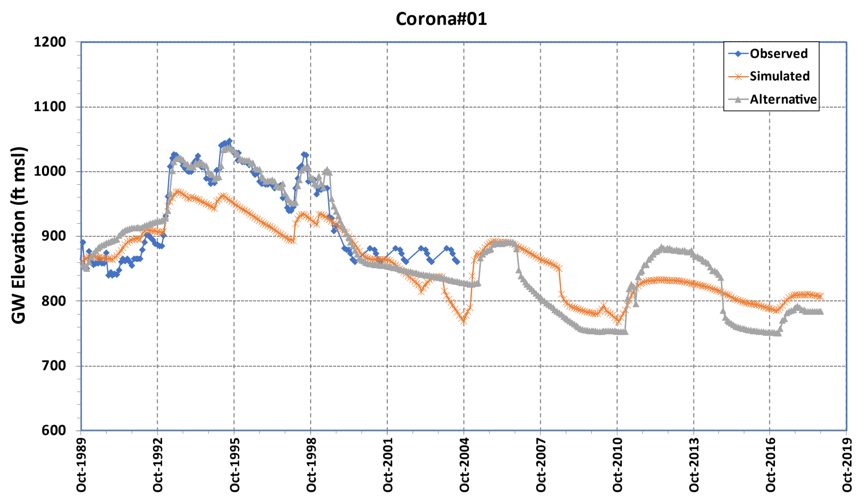
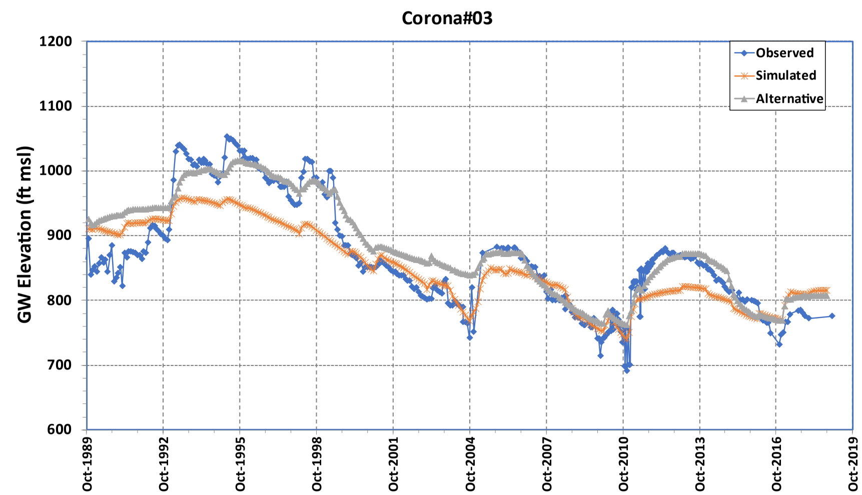
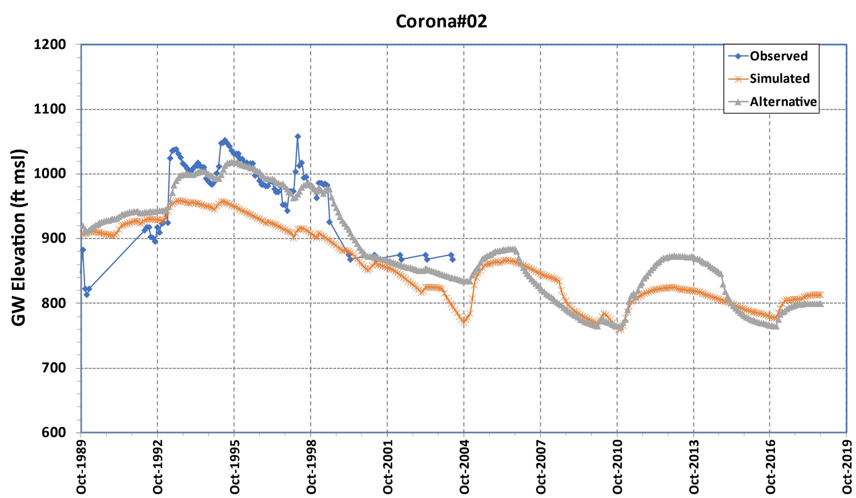
Figure 32
Calibration Hydrographs
Bedford MA
Mid Temescal Wash Area

DRAFT







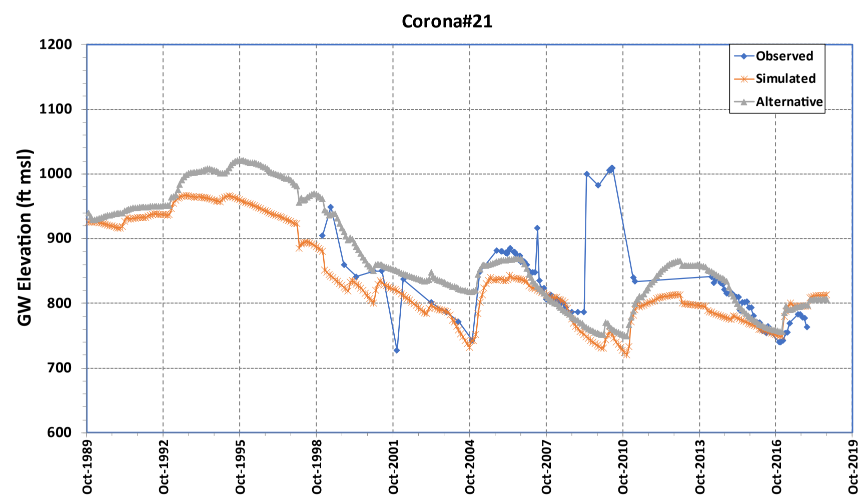


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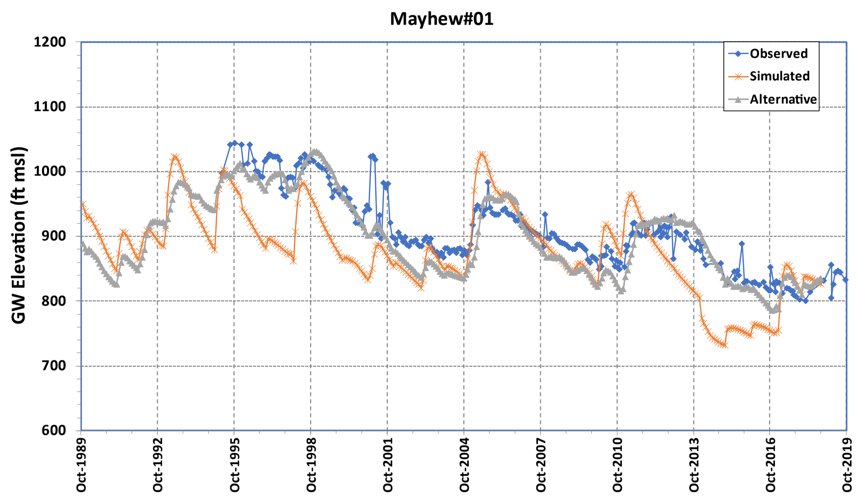
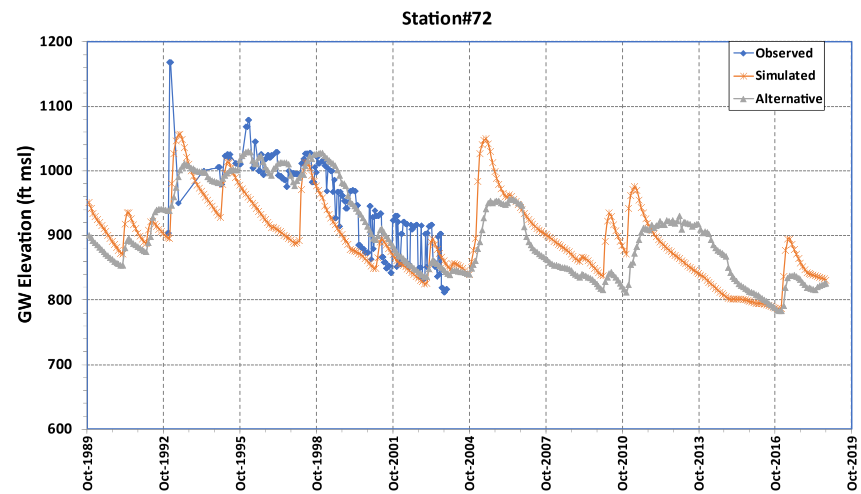
Figure 33
Calibration Hydrographs
Coldwater MA
Coldwater Quarry Area

DRAFT





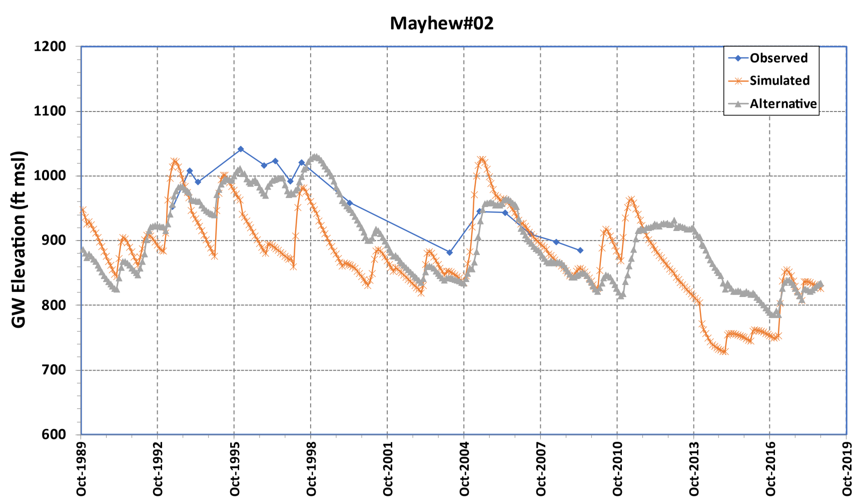


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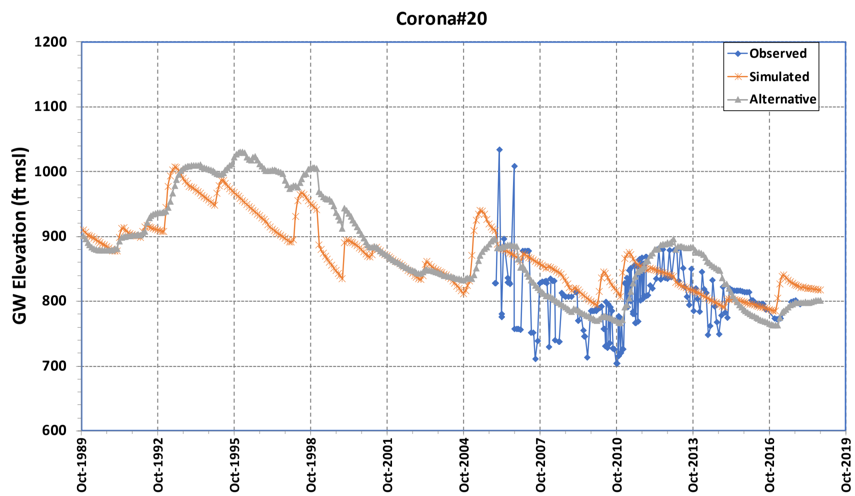
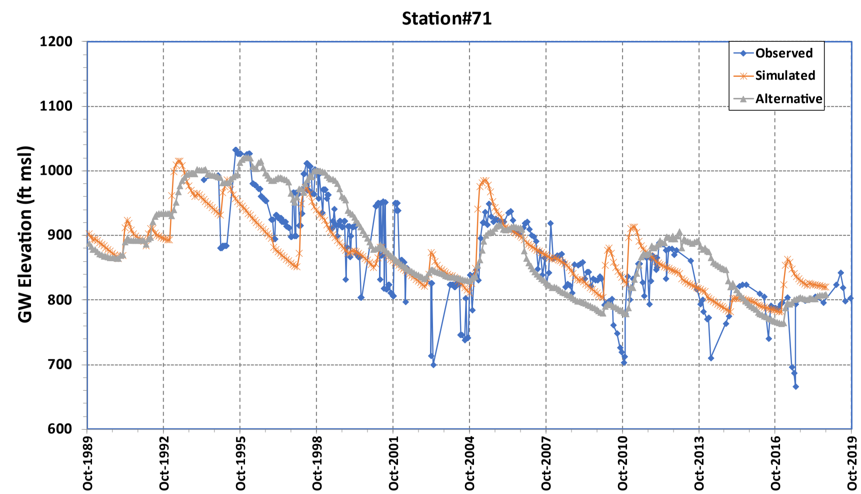
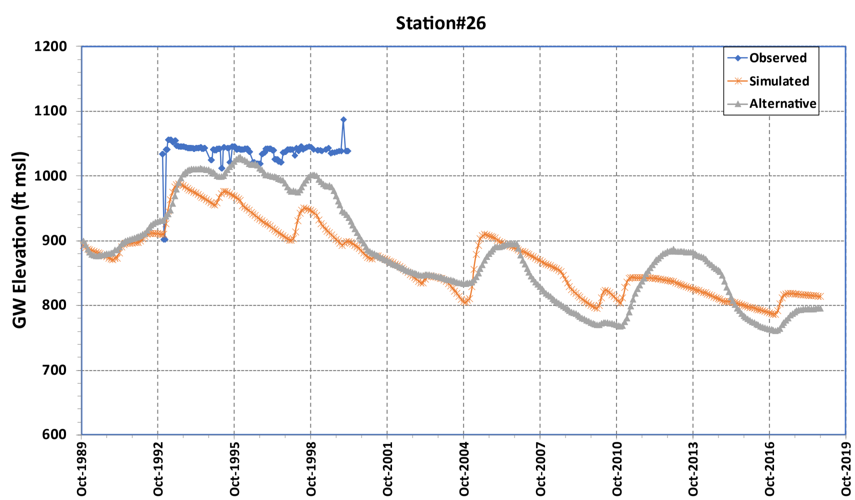
Figure 34
Calibration Hydrographs
Coldwater MA
Mayhew Quarry Area

DRAFT







May 2021	Figure 35 Calibration Hydrographs Coldwater MA Other Quarry Areas
TODD GROUNDWATER	

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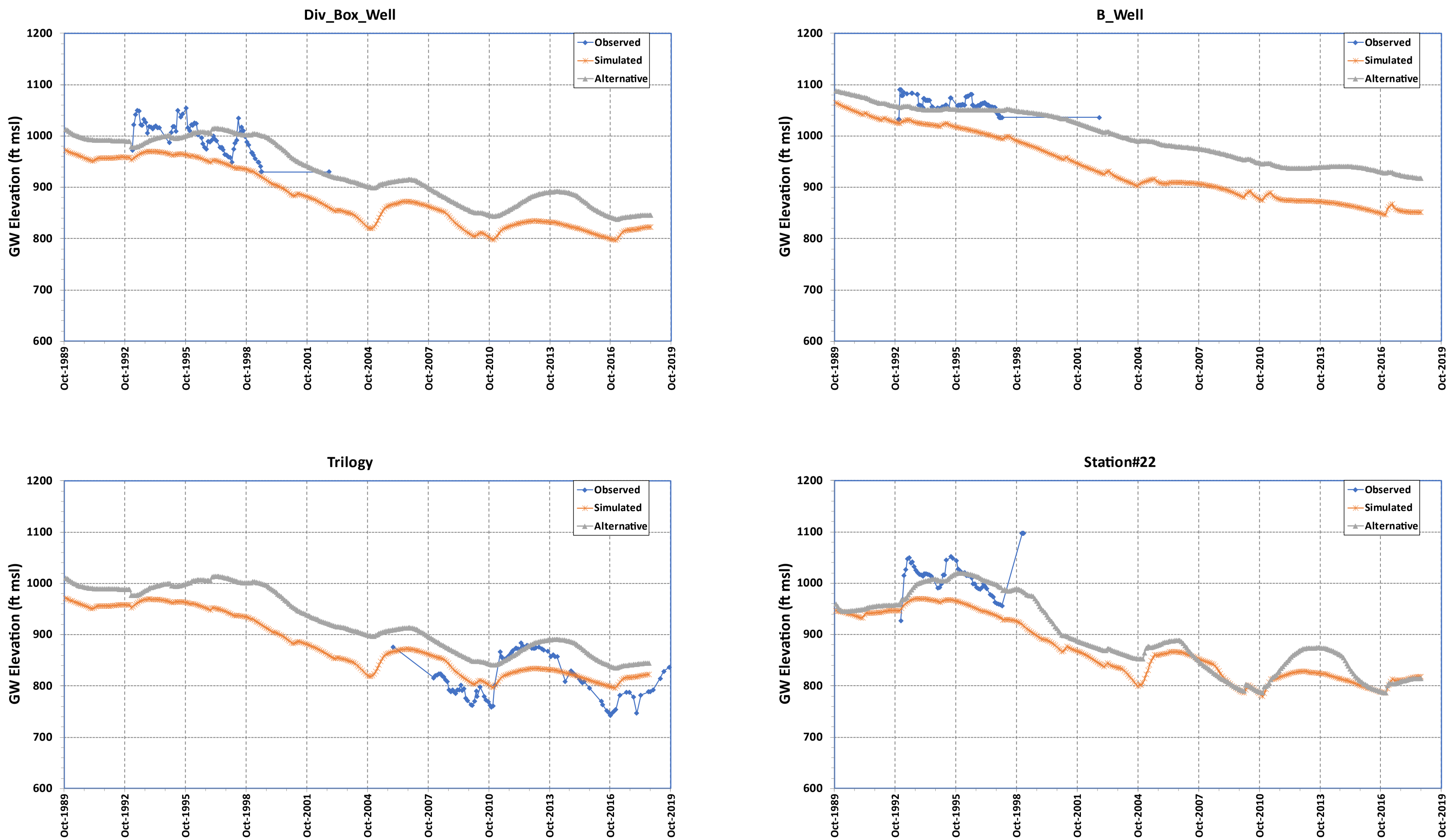

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TODD GROUNDWATER

Figure 36
Calibration Hydrographs
Coldwater MA
North of Quarry Area

DRAFT

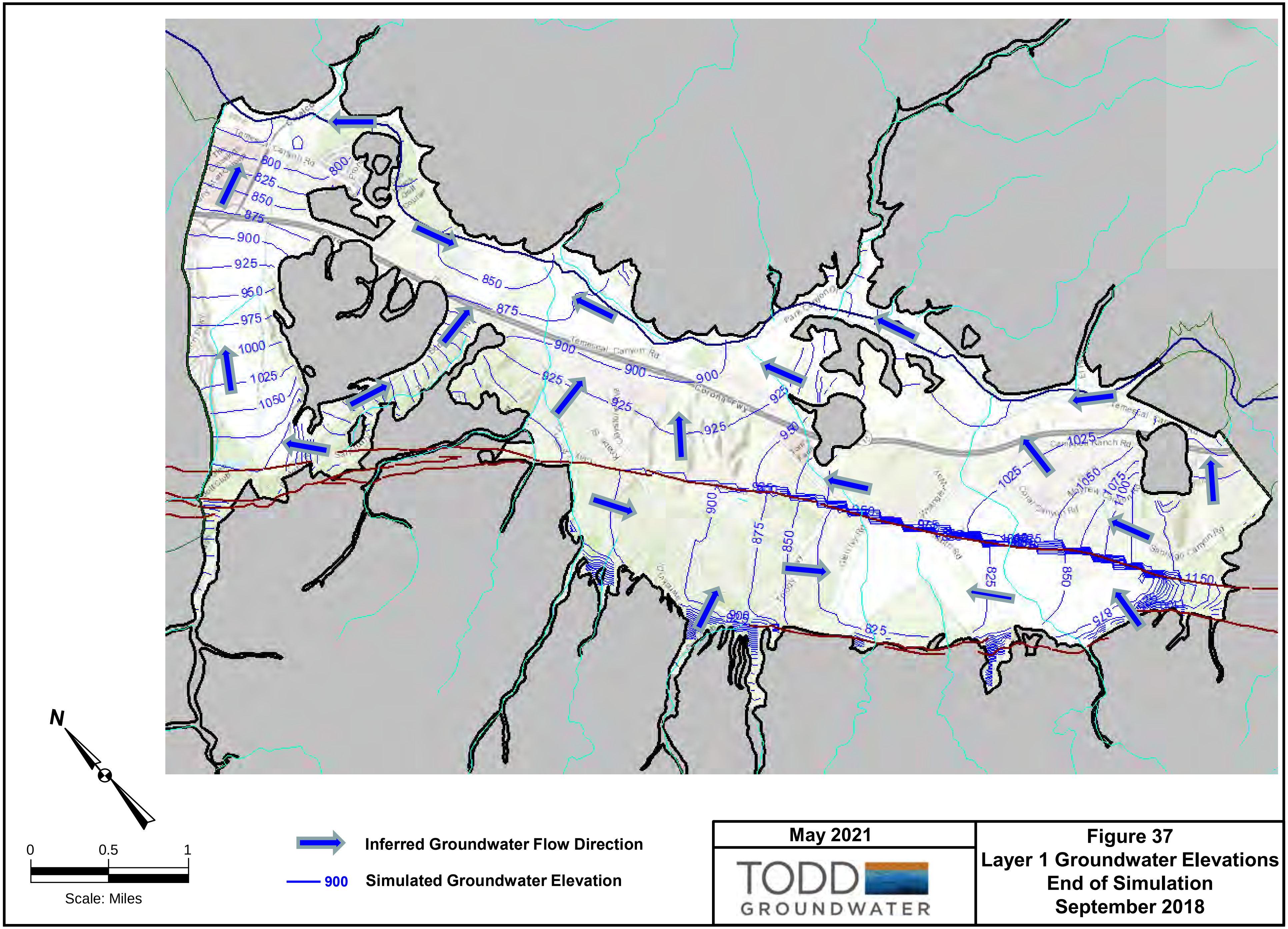

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Figure 37
Layer 1 Groundwater Elevations
End of Simulation
September 2018

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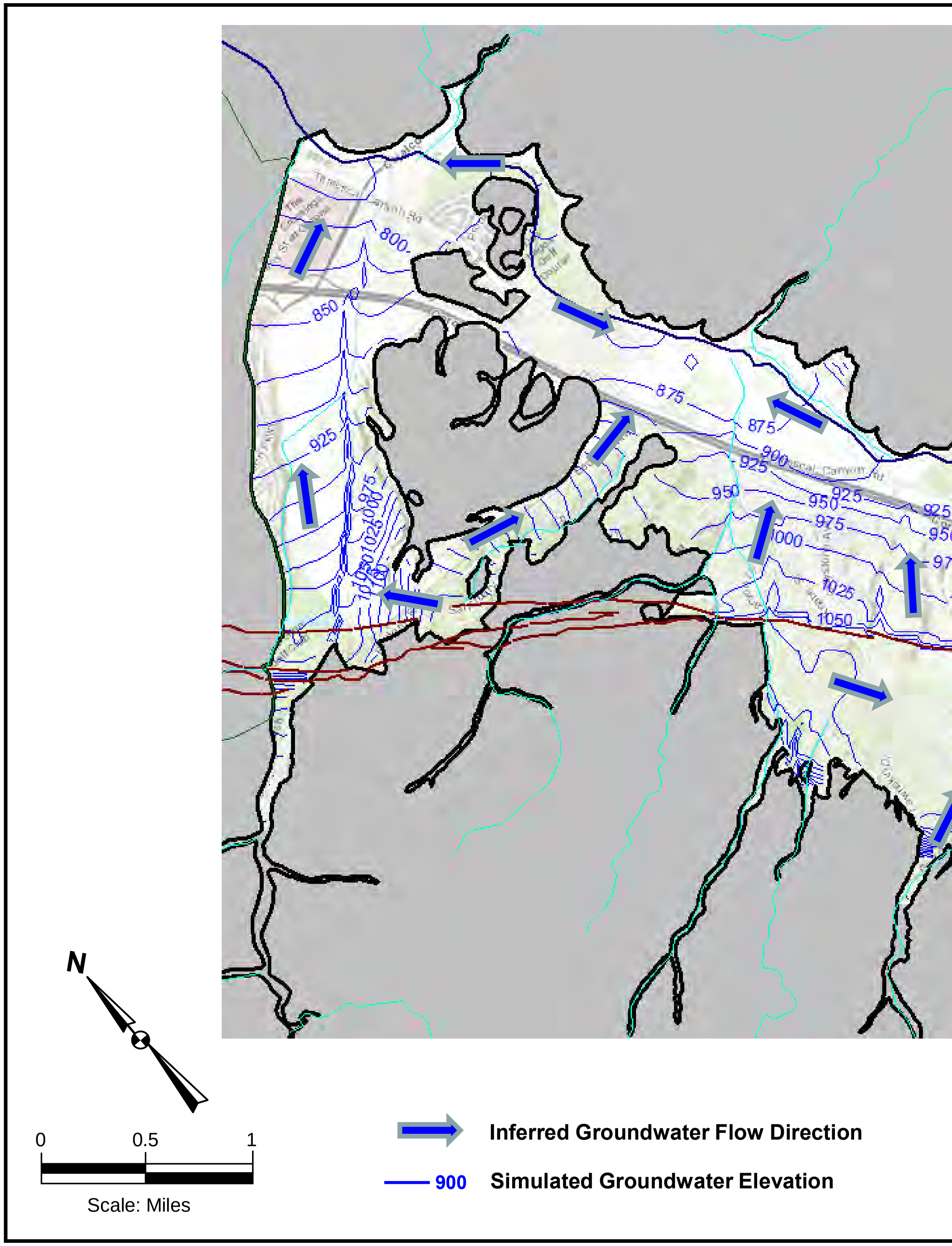

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Figure 38
Layer 1 Groundwater Elevations Near Highest Levels March 1995

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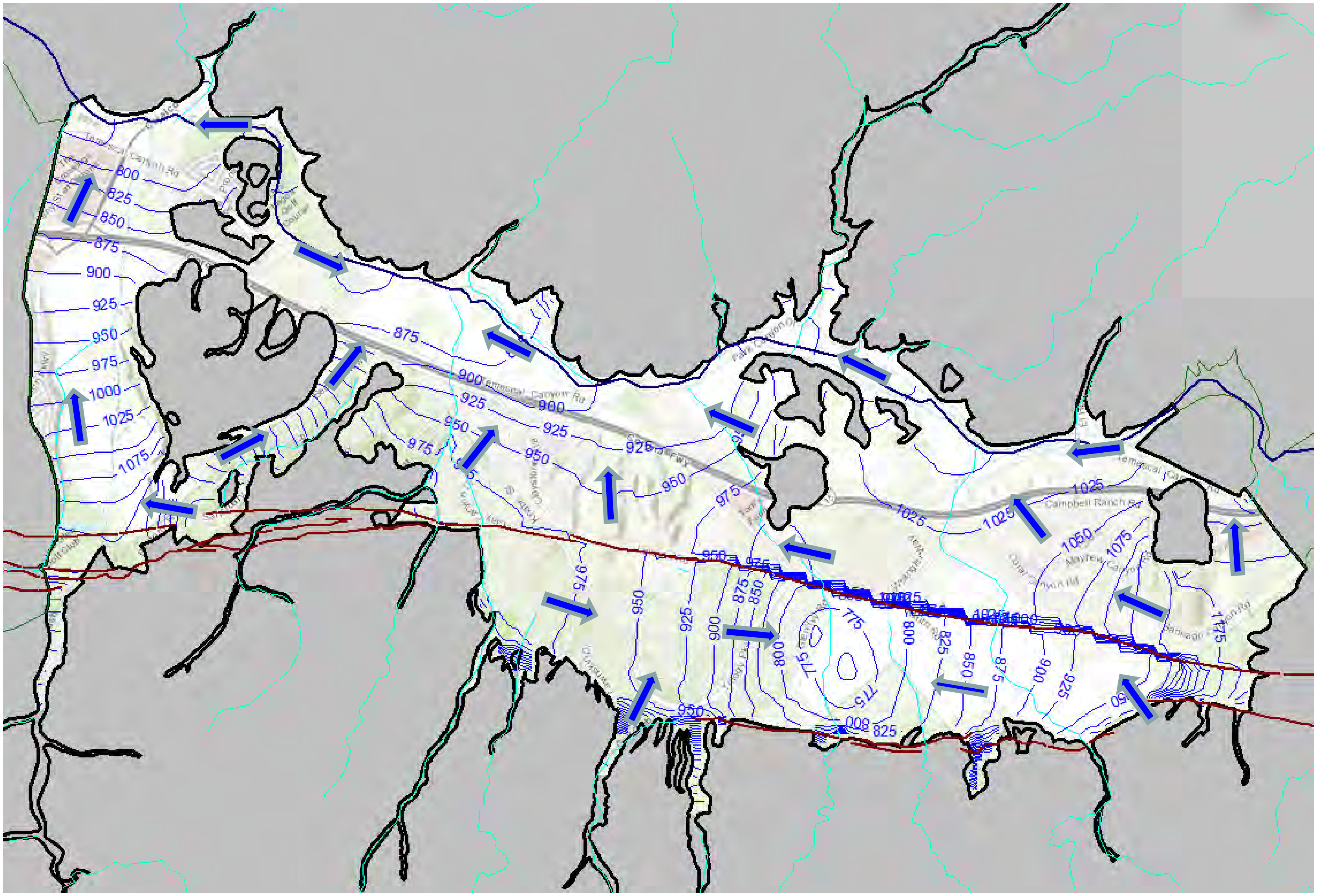

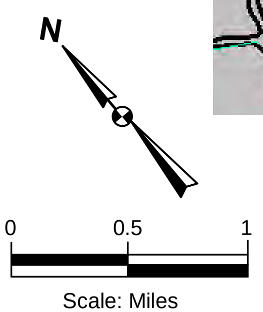

Inferred Groundwater Flow Direction

900 Simulated Groundwater Elevation

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Figure 39
Layer 1 Groundwater Elevations Near Lowest Levels October 2010

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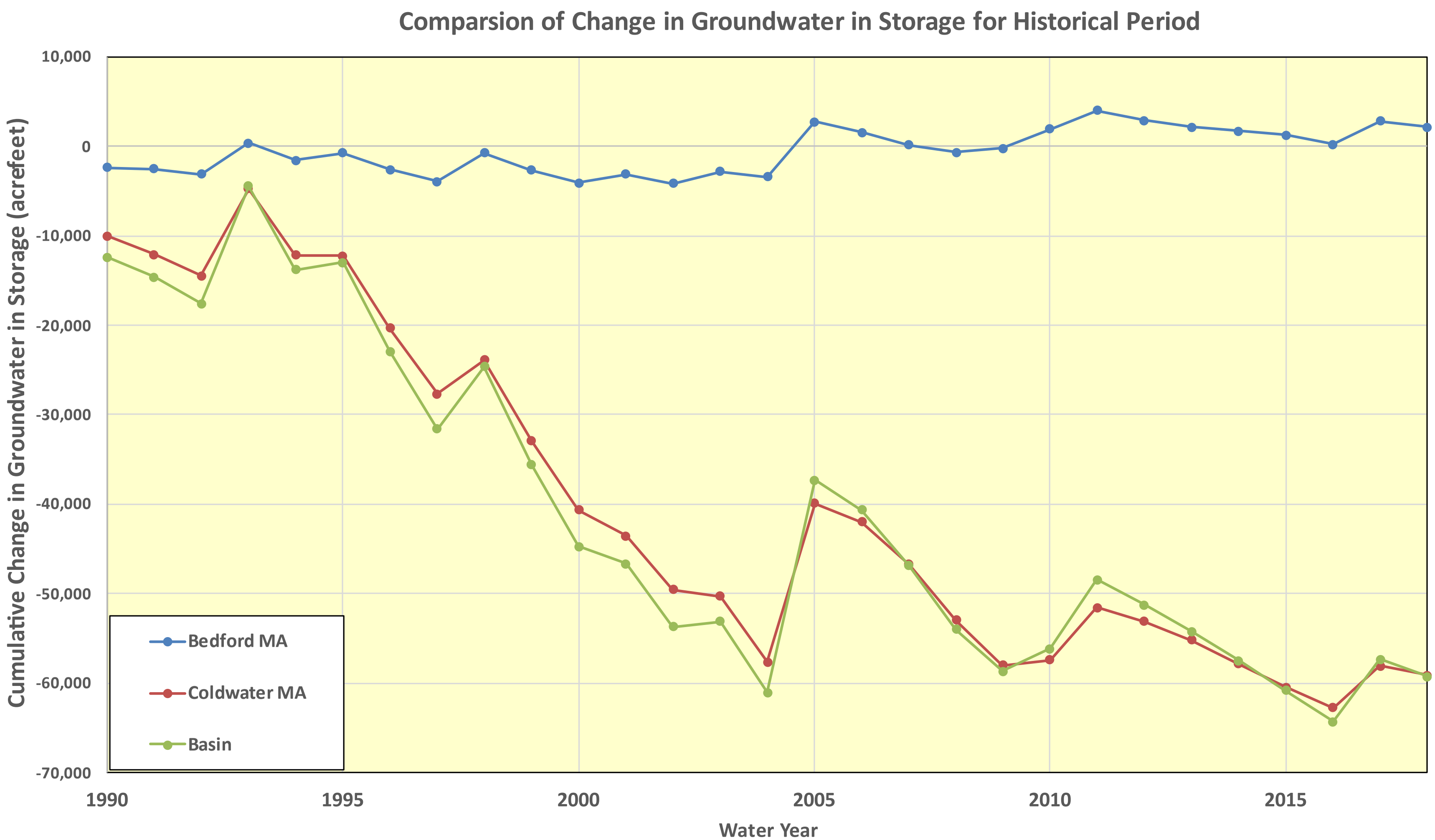

May 2021	Figure 40 Simulated Change in Groundwater in Storage for Historical Simulation
TODD GROUNDWATER	

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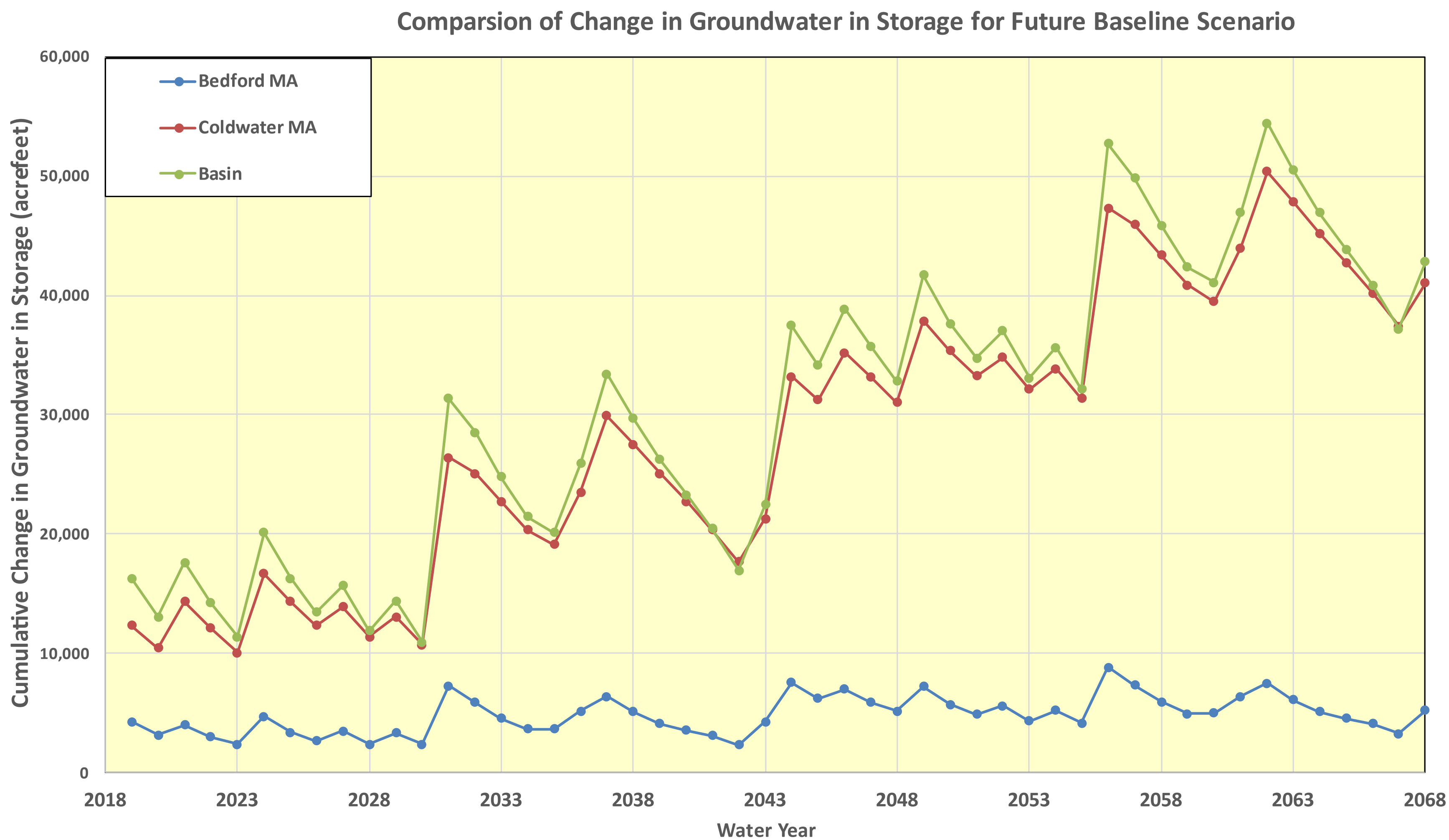

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Figure 41
Simulated Groundwater Storage Change for Future Baseline Scenario

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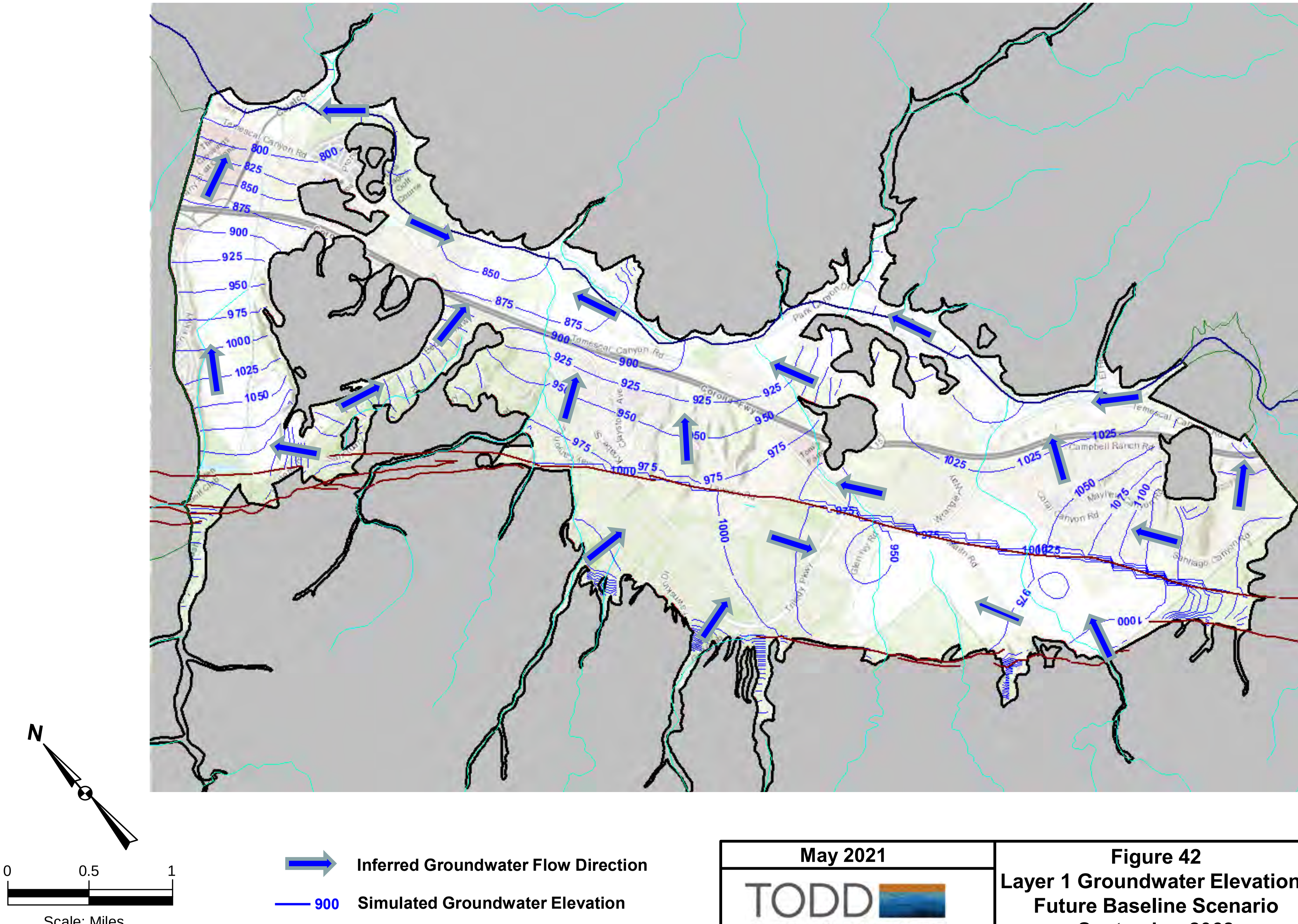


Inferred Groundwater Flow Direction

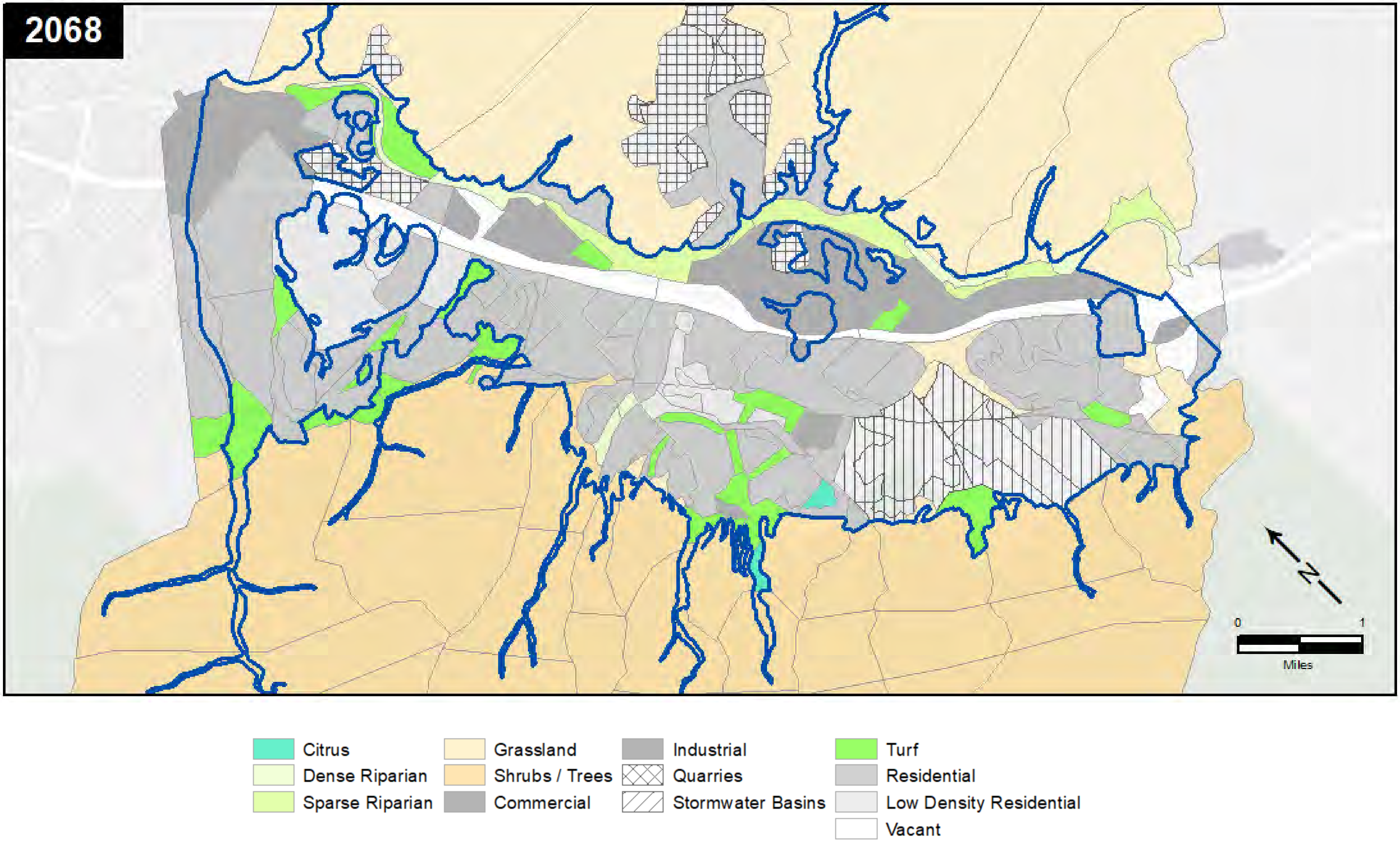
900 Simulated Groundwater Elevation

May 2021

TODD GROUNDWATER

Figure 42
Layer 1 Groundwater Elevations
Future Baseline Scenario
September 2068

DRAFT



May 2021

TODD GROUNDWATER

Figure 43
2018 Land Use for Recharge Polygons for Future Growth Scenario

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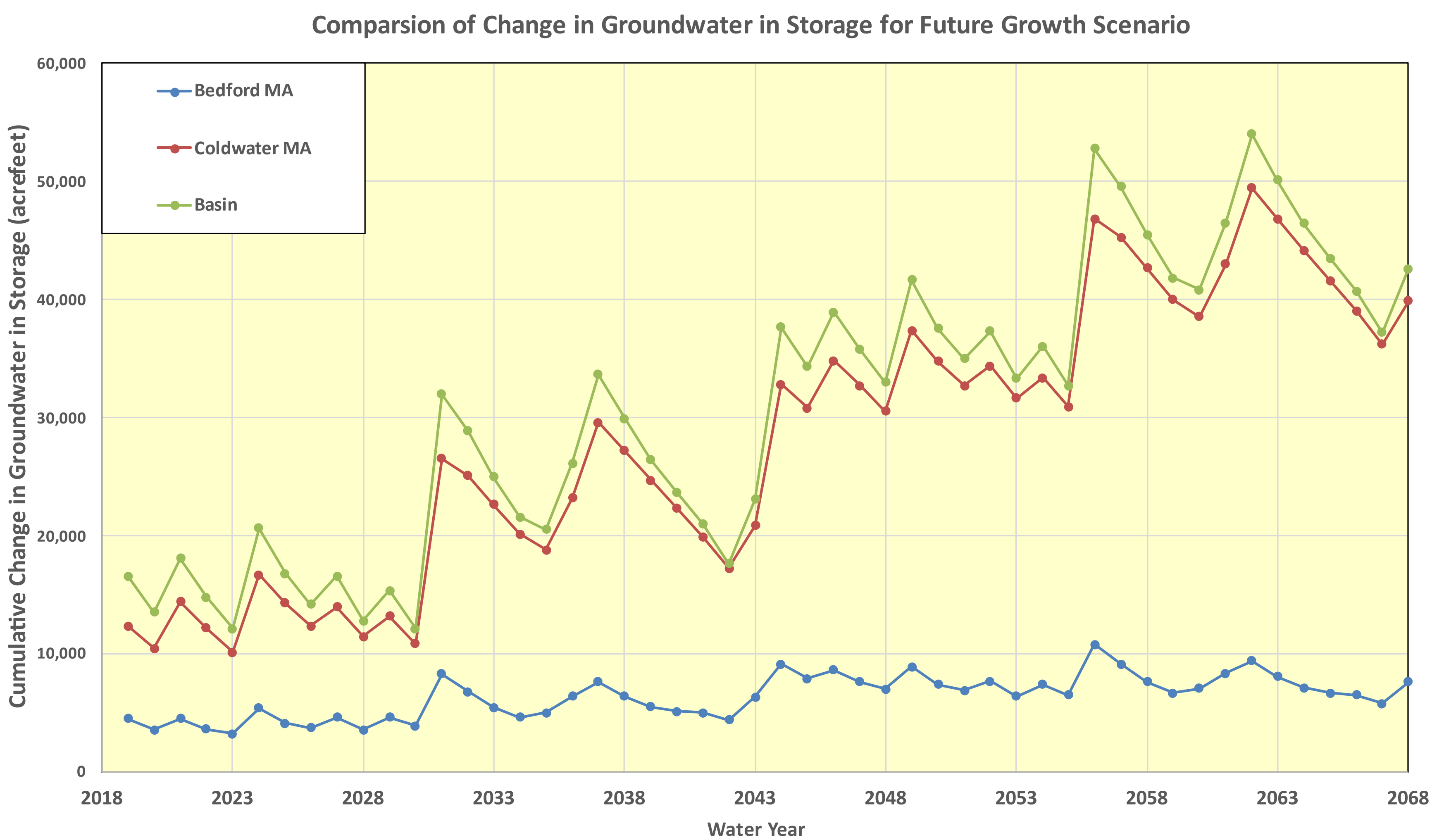

May 2021	Figure 44 Simulated Groundwater Storage Change for Growth-Climate Change Scenario
TODD GROUNDWATER	

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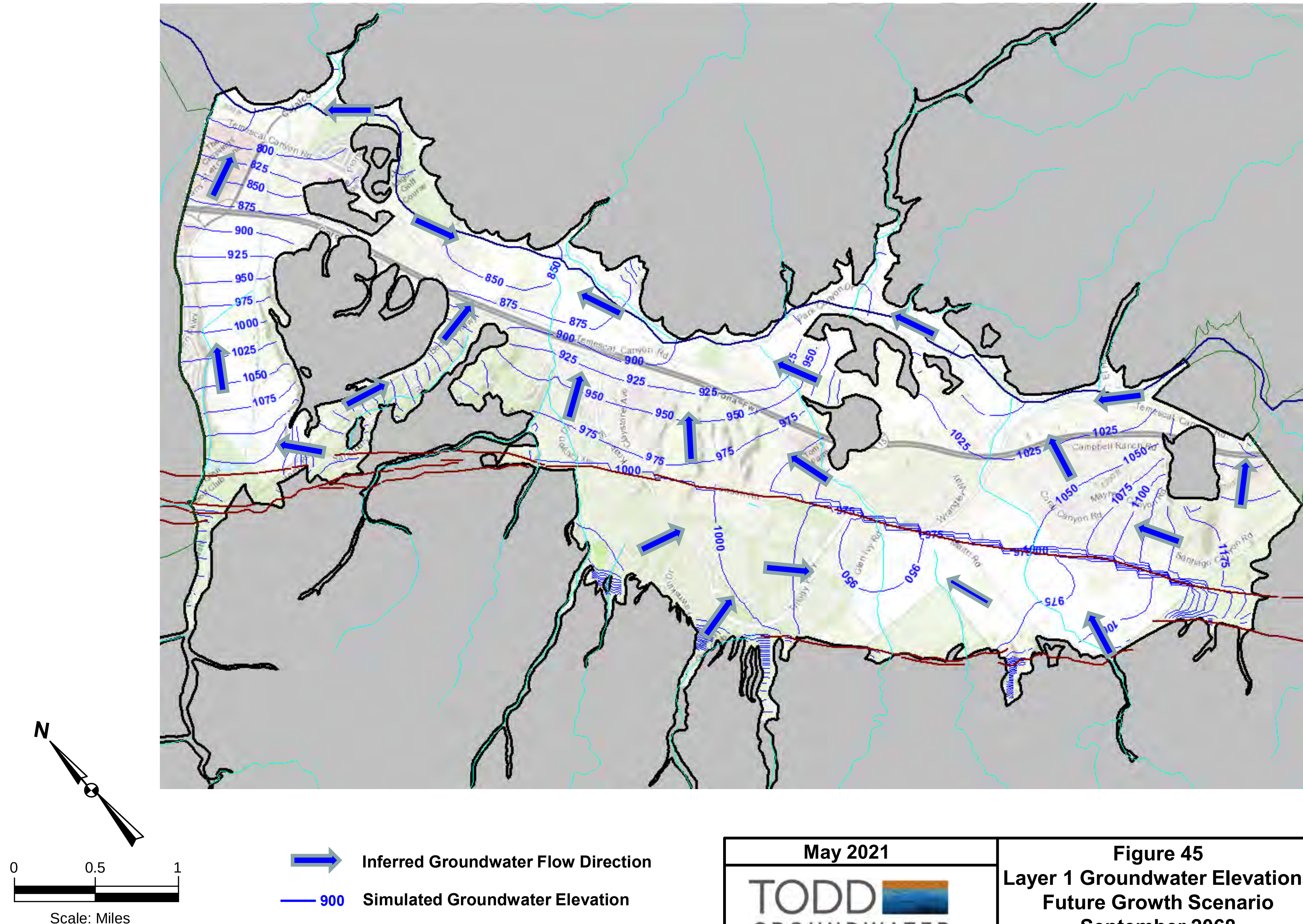


May 2021

TODD GROUNDWATER

Figure 45
Layer 1 Groundwater Elevations
Future Growth Scenario
September 2068

APPENDIX F

Baseline Water Quality Sampling Results

Baseline Water Quality Data - February 2021

WELL NAME	Units	Type of Limit[1]	Limit Concentration[1]	Corona Well 21	Mayhew Well 2	New Sump	Corona Non-Potable Well 1	Station 71	TVWD Well 4	Flagler 2A Well	TVWD TP-1
				Coldwater	Coldwater	Bedford	Bedford	Bedford	Bedford	Bedford	Bedford
11-chloroeicosafluoro 3oxaundecane-1-sulfonic Acid	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
4,8-dioxa-3H-perfluorononanoic Acid (ADONA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
9-chlorohexadecafluoro-3-oxanone-1-sulfonic Acid	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Arsenic	ug/L	MCL-CA	10 ug/L	<2	<2	<2	<2	<2	<2	2.1	<2.0
Bicarbonate	mg/L as CaCO3			190	150	270	240	150	280	280	230
Boron	ug/L	NL	1000 ug/L	<100	<100	260	250	<100	320	160	260
Calcium	mg/L	none		86	66	120	120	74	130	160	120
Carbonate	mg/L as CaCO3			<5	<5	<5	<5	<5	<5	<5.0	<5.0
Chloride	mg/L	SMCL	500 mg/L	30	43	180	170	49	180	140	170
Dissolved Oxygen	mg/L	none		7.9	6.7	1.2	6.1	5.7	5.7	6.4	4.0
E_ coli	MPN/100ml			<1	<1	<1	<1	<1	<1	<1.0	<1.0
Fluoride	mg/L	MCL-CA	2 mg/L	0.46	0.29	0.42	0.44	0.26	0.48	0.21	0.51
Heterotrophic Plate Count	CFU/mL			6	17		1	25	1900	6.0	14
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Hydroxide	mg/L as CaCO3			<5	<5	<5	<5	<5	<5	<5.0	<5.0
Iron	ug/L	SMCL	300 ug/L	140	<100	<100	<100	<100	<100	<100	<100
Magnesium	mg/L	none		16	15	30	32	18	30	50	35
Manganese	ug/L	SMCL	50 ug/L	20	<20	<20	<20	24	38	<20	<20
N-EtFOSAA	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Nitrate as N	mg/L	MCL-CA	10 mg/L	1.9	2.5	0.82	2.6	2.1	1.3	7.4	2.0
N-MeFOSAA	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Perfluorobutanesulfonic Acid (PFBS)	ng/L	NL	500 ng/L	0.81	2.2	26	27	2.4	29	15	27
Perfluorodecanoic Acid (PFDA)	ng/L			0.19	<1.7	0.72	0.21	0.32	3.2	<1.7	0.36
Perfluorododecanoic Acid (PFDoDA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Perfluoroheptanoic Acid (PFHpA)	ng/L			0.19	1	1.5	3.3	2.9	4.2	4.4	2.2
Perfluorohexanesulfonic Acid (PFHxS)	ng/L			<1.7	1.8	7.2	5	2.8	9.8	3.3	8.9
Perfluorohexanoic Acid (PFHxA)	ng/L			0.89	2.5	4.1	8.3	5.6	9.3	10	4.1
Perfluorononanoic Acid (PFNA)	ng/L			<1.7	0.21	3.8	2.3	0.87	2.3	0.65	1.2
Perfluorooctanesulfonic Acid (PFOS)	ng/L	RL	40 ng/L	<1.7	0.91	11	11	4.1	14	4.0	11
Perfluorooctanoic Acid (PFOA)	ng/L	RL	10 ng/L	0.34	2.9	11	14	7.8	25	11	18
Perfluorotetradecanoic Acid (PFTeDA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Perfluorotridecanoic Acid (PFTrDA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
Perfluoroundecanoic Acid (PFUnA)	ng/L			<1.7	<1.7	<1.7	<1.7	<1.7	<1.8	<1.7	<1.7
pH (at Site, grab)	pH Units			7.4	7.2	6.8	7	7.3	7.3	7.1	7.0
Potassium	mg/L	none		1.6	1.8	3.8	3.3	1.8	3.3	3.7	6.1
Sodium	mg/L	US-HAL	200 mg/L	38	48	140	120	43	140	83	150
Specific Conductance	umhos/cm	SMCL	1600 UMHOS/CM	710	570	1200	1400	610	1300	1300	1300
Sulfate	mg/L	SMCL	500 mg/L	120	110	190	230	120	200	270	270
Temperature (at Site, grab)	°C			20	17	23	18	19	22	19	22
Total Alkalinity	mg/L as CaCO3	none		190	150	270	240	150	280	280	230
Total Coliform	MPN/100ml			<1	<1	46	<1	<1	<1	<1.0	<1.0
Total Dissolved Solids	mg/L	SMCL	1000 mg/L	440	410	820	910	430	850	930	900
Total Organic Carbon	mg/L			<0.3	0.31	1.6	0.59	0.61	1.2	0.30	1.0
Turbidity-at site	NTU			1.8	0.28	0.34	1.2	0.25	0.75	0.57	0.52

Notes:

[1]: Limits on constituent concentrations in water come from multiple sources, as indicated below (https://oehha.ca.gov/water/notification-levels-chemicals-drinking-water):

NL: California drinking water Notification Levels
SMCL: California Secondary Maximum Contiment Level,
AL: Agricultural Limit
MCL: California Secondary Maximum Contiment Level
US-HAL: Federal Health Advisory Limit
RL: California Response Level

APPENDIX G

Management Areas Designated in the Bedford Coldwater Subbasin to be Included in the Groundwater Sustainability Plan

INTRODUCTION

This memorandum summarizes the Management Areas (MAs) designated in the Bedford Coldwater Subbasin (Subbasin) to be included in the Groundwater Sustainability Plan (GSP) developed for the Bedford Coldwater Groundwater Sustainability Agency (BCGSA). As defined in the GSP Regulations, the purpose of MAs is to facilitate implementation of the GSP. The objective of this memorandum is to summarize the rational for creating each MA within the Bedford Coldwater Subbasin.

Management Areas will be described in Section 5 of the GSP, along with sustainability goals, characterization of undesirable results, and minimum thresholds and measurable objectives for each sustainability indicator. These indicators will be described for each MA. Consistent with the GSP Regulations, MAs will be presented in terms of:

- Reason for creation of each MA
- Descriptions, maps, and other information required by GSP Regulations to describe conditions in each MA
- Level of monitoring and analysis appropriate for each MA
- Explanation of how management of MAs will not cause undesirable results outside the MA

The purpose of dividing a basin into Management Areas is to facilitate implementation of the GSP in instances where a basin has distinctly different areas with unique management needs. As defined in the GSP Regulations, a MA is an area within a basin for which the GSP may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. Although a MA may have different minimum thresholds and be operated according to different measurable objectives than the basin as a whole, undesirable results must still be defined consistently throughout the Subbasin. The operation of each MA must also be managed in a way so as not to cause undesirable results outside of that MA.

The Bedford Coldwater Subbasin is a subbasin of the Elsinore Basin and covers approximately 11 square miles in western Riverside County. The Subbasin covers a portion of the Santa Ana River watershed. The main tributaries to the Santa Ana River include Temescal Creek, which flows through the Subbasin from the southeast to the northwest, and the Bedford Wash, which flows to the northeast along the northern boundary of the Subbasin. The Subbasin is located within the Elsinore-Temecula trough, a low-lying structural block between the Santa Ana Mountains to the west and the Perris Plain on the east. The Subbasin is separated from the Temescal Subbasin to the northwest by a groundwater divide near Bedford Wash. A jurisdictional boundary separates the Subbasin with the Elsinore Valley Subbasin to the south. The Subbasin is thin in some areas, which impedes groundwater flow especially at the northern and southern boundaries.

The Glen Ivy fault separates the Bedford area from the Coldwater area, resulting in differing geology, water use, water quality, and sources of water between the two areas. These differences serve as the basis for defining two management areas in the Subbasin for the purpose of facilitating implementation of the GSP.

The Bedford Coldwater Subbasin is divided into two MAs, Bedford and Coldwater, as defined in the following sections. The MAs will be used in the water budget analysis (presented in Section 5 of the GSP) and in numerical modeling. The MAs will be used to help define the sustainability criteria (undesirable results, minimum thresholds, management objectives) described in Section 6.

DEFINITION OF BEDFORD MANAGEMENT AREA

The Bedford MA is the area east of the Glen Ivy fault to the Estelle Mountain, as shown in Figure 1. The fault offsets the aquifer units in the Bedford MA from the units in the Coldwater MA by up to approximately 250 feet (Todd, 2019), with the west side of the fault (Coldwater MA) down dropped relative to the east side of the fault (Bedford MA). Alluvial sediments are up to 500 feet thick in the Bedford MA, and up to 800 feet deep in the Coldwater MA (Todd and AKM, 2008). Land uses are primarily urban residential and commercial/industrial in the Bedford MA. The only groundwater pumpers in the Bedford MA are the three member agencies of the BCGSA.

The 2017 Upper Temescal Valley Salt and Nutrient Management Plan (SNMP) separates the Bedford area from the Coldwater area and combines it with the Upper Temescal Valley groundwater management zone (GMZ; WEI, 2017).

DEFINITION OF COLDWATER MANAGEMENT AREA

The Coldwater MA is the area located within a down-dropped block between the Glen Ivy fault and the Santa Ana Mountains. Alluvial sediments are more than 800 feet thick in the Coldwater MA (Todd and AKM, 2008). In addition to a greater depth to bedrock, a factor distinguishing the Coldwater MA from the Bedford MA is that most of the groundwater pumping in the Subbasin occurs within this area. The City of Corona and Elsinore Valley Municipal Water District established a production agreement in 2008 to ensure the sustainable use of groundwater in the Coldwater area (EVMWD, 2008). Glen Ivy Hot Springs also has one well in the area that serves an estimated 750 people.

The Coldwater area is a separate groundwater management zone in the 2017 Upper Temescal Valley SNMP due to its distinct geologic structure and deep aquifer units (WEI, 2014).

REFERENCES

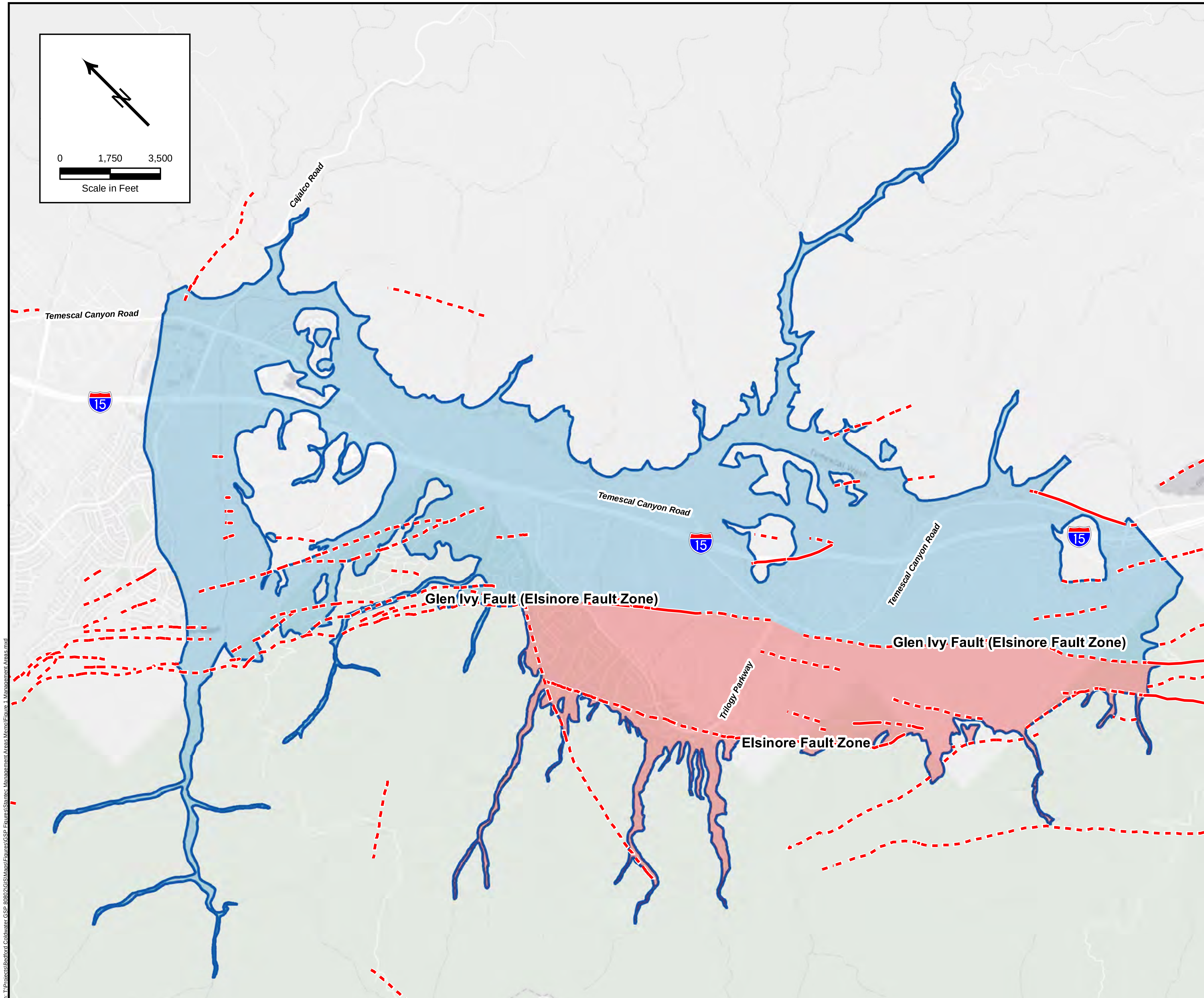
Corona and Elsinore Valley Municipal Water District (EVMWD), 2008. Agreement Concerning Water Production from Coldwater. December.

Todd Groundwater (Todd), 2019. Bedford-Coldwater Basin Existing Data Transmittal. February 9.

Todd Engineers and AKM Consulting Engineers (Todd and AKM), 2008. AB3030 Groundwater Management Plan. Prepared for the City of Corona. June.

Wildermuth Environmental, Inc. (WEI), 2014. Rationale for Creating the Upper Temescal Valley Groundwater Management Zone. Letter to EVMWD and Eastern Municipal Water District. September 8.

WEI, 2017. Salt and Nutrient Management Plan for the Upper Temescal Valley. Final September.



TODD GROUNDWATER

Figure 1
Management Areas

APPENDIX H

Detailed Annual Surface and Groundwater Budgets

Bedford-Coldwater Basin Surface Water Budget, Model Calibration Period (1990 to 2018)

Water Year	BEDFORD MANAGEMENT AREA (acre-feet per year)								COLDWATER MANAGEMENT AREA (acre-feet per year)			
	Outflow from Elsinore Subbasin to Bedford MA	Inflow from Coldwater MA	TVWD WRF Discharge into Wash	City of Corona WRF3 Discharge to Wash	Tributary and Local Runoff	Stream Percolation to Groundwater	Seepage from Groundwater to Streams	Surface Outflow to Temescal Basin	Tributary and Local Runoff	Stream Percolation to Groundwater	Inflow from Groundwater to Streams	Outflow to Bedford MA
1990	24,043	308	0	0	260	863	731	24,479	284	331	355	308
1991	5,398	2,308	7	0	4,043	2,248	559	10,066	6,175	4,055	188	2,308
1992	3,142	495	48	0	1,524	1,344	409	4,274	3,526	3,141	111	495
1993	63,144	8,156	134	0	24,997	3,920	1,495	94,005	24,042	15,979	93	8,156
1994	6,915	138	273	0	446	1,042	950	7,680	401	324	61	138
1995	8,510	2,462	402	0	7,184	2,422	1,080	17,215	9,416	6,998	43	2,462
1996	2,565	108	406	0	343	494	563	3,491	157	68	19	108
1997	1,392	132	414	0	435	206	233	2,401	270	139	1	132
1998	13,755	4,252	534	0	14,078	3,159	832	30,293	15,077	10,831	5	4,252
1999	4,682	87	840	0	503	341	413	6,184	88	1	0	87
2000	695	93	1,034	0	657	146	117	2,450	474	381	0	93
2001	3,940	668	690	0	2,890	1,731	193	6,651	4,063	3,396	2	668
2002	1,671	95	709	0	435	72	94	2,933	96	1	0	95
2003	6,056	2,067	844	0	3,968	1,655	152	11,433	5,597	3,532	2	2,067
2004	2,928	122	893	0	769	153	83	4,642	285	163	0	122
2005	49,649	13,308	1,029	0	32,278	4,947	2,377	93,695	32,138	18,840	10	13,308
2006	24,731	329	1,068	19	1,512	2,135	2,170	27,693	2,059	1,735	4	329
2007	12,768	22	1,335	50	480	1,031	1,114	14,737	35	14	0	22
2008	8,843	27	1,317	80	370	682	666	10,621	40	13	0	27
2009	6,339	164	1,455	111	947	1,205	637	8,447	1,539	1,377	2	164
2010	14,242	4,676	1,424	172	9,419	2,888	949	27,995	10,297	5,625	4	4,676
2011	23,939	6,872	1,397	194	12,566	3,069	1,580	43,480	14,107	7,239	4	6,872
2012	2,989	163	1,405	109	322	1,172	1,187	5,003	164	1	0	163
2013	1,873	87	0	205	-18	931	831	2,048	88	1	0	87
2014	0	140	0	150	159	664	568	352	267	127	0	140
2015	0	182	0	130	344	577	450	529	362	180	0	182
2016	0	111	0	137	159	403	257	261	273	162	0	111
2017	10,667	4,552	0	148	7,583	2,847	660	20,763	10,608	6,058	2	4,552
2018	2,082	95	0	162	205	727	433	2,250	299	205	0	95

Bedford Management Area Detailed Annual Water Budget, Model Calibration Period (1990 to 2018)

	Water Year and Type[1]																												
	1990 D	1991 AN	1992 AN	1993 W	1994 BN	1995 W	1996 D	1997 D	1998 W	1999 D	2000 D	2001 N	2002 D	2003 AN	2004 W	2005 W	2006 BN	2007 D	2008 D	2009 BN	2010 AN	2011 W	2012 BN	2013 D	2014 D	2015 BN	2016 D	2017 W	2018 D
Inflows (AFY)																													
Subsurface inflow	1,493	1,514	1,054	423	637	427	563	849	354	342	499	556	977	654	562	124	87	143	313	148	80	75	94	165	399	192	92	80	72
Percolation from streams	863	2,248	1,344	3,920	1,042	2,422	494	206	3,159	341	146	1,731	72	1,655	153	4,947	2,135	1,031	682	1,205	2,888	3,069	1,172	931	664	577	403	2,847	727
Bedrock inflow	980	981	979	977	978	1,185	1,194	1,046	897	833	629	592	693	547	393	848	1,119	1,080	1,019	969	706	765	894	897	894	686	297	341	382
Dispersed recharge: non-irrigated land	46	126	102	2,629	63	894	82	123	1,800	127	156	381	13	579	165	4,227	424	-23	17	395	1,621	2,154	249	135	198	332	166	1,581	51
Dispersed recharge: irrigated land	556	1,050	801	2,072	477	1,082	459	493	1,296	390	504	773	340	691	400	1,961	654	282	227	473	736	905	365	305	390	438	387	742	347
Pipe leaks	91	94	96	100	104	110	114	117	124	130	125	120	122	131	142	149	154	153	153	155	154	150	155	164	174	184	191	198	187
Reclaimed water percolation	0	0	0	0	0	20	40	62	107	210	309	373	473	691	891	1,029	854	801	525	291	285	0	487	1,575	1,646	1,462	386	3,438	2,862
Quarry recharge	74	7	18	418	314	121	111	11	36	1	14	85	56	29	37	1	38	0	0	72	14	30	18	22	25	178	252	404	353
Total Inflow	4,103	6,020	4,395	10,538	3,614	6,260	3,057	2,907	7,772	2,375	2,381	4,611	2,746	4,978	2,743	13,287	5,466	3,466	2,936	3,707	6,483	7,148	3,434	4,194	4,390	4,049	2,174	9,631	4,980
Outflows (AFY)																													
Subsurface outflow	-57	-59	-46	-370	-117	-105	-48	-33	-287	-117	-33	-30	-24	-41	-20	-553	-743	-166	-20	-150	-457	-762	-270	11	46	-171	-207	-463	-357
Wells - M&I and domestic	-2,570	-2,935	-2,251	-2,252	-1,874	-1,486	-1,896	-1,662	-373	-1,055	-1,336	-1,400	-1,824	-833	-1,046	-188	-306	-995	-1,149	-643	-390	-59	-779	-1,079	-1,346	-947	-966	-1,876	-2,173
Wells - agricultural	-1,739	-1,121	-965	-978	-1,065	-863	-658	-945	-1,089	-806	-750	-640	-388	-808	-394	-714	-648	-172	13	-152	-279	-176	147	47	38	-255	-225	251	729
Groundwater discharge to streams	-731	-559	-409	-1,495	-950	-1,080	-563	-233	-832	-413	-117	-193	-94	-152	-83	-2,377	-2,170	-1,114	-666	-637	-949	-1,580	-1,187	-831	-568	-450	-257	-660	-433
Riparian evapotranspiration	-394	-369	-306	-768	-531	-609	-427	-267	-545	-369	-195	-294	-268	-341	-311	-1,037	-773	-497	-350	-418	-626	-919	-759	-625	-564	-429	-292	-585	-359
Quarry outflow	-973	-1,153	-1,012	-1,214	-1,006	-1,297	-1,252	-1,112	-1,471	-1,558	-1,373	-1,108	-1,145	-1,447	-1,490	-2,279	-1,982	-1,972	-1,542	-1,290	-1,654	-1,583	-1,689	-2,455	-2,438	-2,241	-1,232	-3,736	-3,062
Total Outflow	-6,464	-6,196	-4,988	-7,076	-5,544	-5,441	-4,845	-4,252	-4,597	-4,318	-3,804	-3,664	-3,743	-3,622	-3,344	-7,149	-6,622	-4,917	-3,714	-3,291	-4,355	-5,080	-4,537	-4,932	-4,831	-4,493	-3,178	-7,069	-5,655
Storage Change (AFY)																													
Total Inflows minus Total Outflows	-2,361	-176	-593	3,462	-1,930	819	-1,787	-1,345	3,174	-1,944	-1,423	947	-998	1,356	-601	6,138	-1,157	-1,451	-778	416	2,128	2,069	-1,103	-738	-440	-444	-1,005	2,562	-675

Notes:

[1]: Water year types are described in Section 5 - Water Budget, and shown on Figure 5-1. Water year types are summarized above as follows D = Dry, Below Normal = BN, N = Normal, AN = Above Normal, W = Wet.

Coldwater Management Area Detailed Annual Water Budget, Model Calibration Period (1990 to 2018)

	Water Year and Type[1]																												
	1990 D	**1991 AN**	**1992 AN**	**1993 W**	**1994 BN**	**1995 W**	**1996 D**	**1997 D**	**1998 W**	**1999 D**	**2000 D**	**2001 N**	**2002 D**	**2003 AN**	**2004 W**	**2005 W**	**2006 BN**	**2007 D**	**2008 D**	**2009 BN**	**2010 AN**	**2011 W**	**2012 BN**	**2013 D**	**2014 D**	**2015 BN**	**2016 D**	**2017 W**	**2018 D**
Inflows (AFY)																													
Subsurface inflow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	77	40	18	24	51	83	106	85	85	95	107	117	136	123
Percolation from streams	331	4,055	3,141	15,979	324	6,998	68	139	10,831	1	381	3,396	1	3,532	163	18,840	1,735	14	13	1,377	5,625	7,239	1	1	127	180	162	6,058	205
Bedrock inflow	676	678	675	665	667	788	818	675	570	522	419	397	468	410	338	542	736	725	661	619	508	476	558	562	536	408	166	165	277
Dispersed recharge: non-irrigated land	10	30	59	978	-8	376	-34	-38	723	-14	32	265	-5	325	72	1,976	260	0	10	297	805	1,022	78	43	95	121	78	785	52
Dispersed recharge: irrigated land	305	635	496	1,202	303	685	298	291	766	209	309	402	226	520	228	1,105	339	147	134	283	446	535	201	161	207	249	213	436	193
Pipe leaks	19	20	21	22	22	21	21	21	22	23	29	35	37	40	40	41	42	42	41	40	39	38	39	41	44	46	48	50	47
Quarry runoff recharge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inflow	1,341	5,418	4,393	18,845	1,308	8,868	1,171	1,088	12,912	740	1,169	4,494	728	4,826	850	22,582	3,152	945	883	2,667	7,506	9,416	961	892	1,104	1,111	784	7,631	896
Outflows (AFY)																													
Subsurface outflow	-320	-296	-277	-217	-238	-182	-179	-164	-101	-100	-84	-59	-49	-9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wells - M&I and domestic	-4,148	-4,447	-5,368	-8,150	-6,285	-7,887	-6,968	-6,289	-8,104	-8,344	-5,711	-4,012	-3,911	-3,744	-3,634	-4,110	-5,089	-4,791	-4,520	-4,179	-4,122	-2,391	-2,372	-2,989	-3,927	-3,113	-2,961	-2,078	-973
Wells - agricultural	-2,164	-1,627	-995	-343	-2,166	-721	-2,088	-1,996	-811	-1,312	-1,746	-1,300	-680	-329	-239	-62	65	-211	-172	-182	-128	-536	-120	40	144	-245	-92	-343	-395
Groundwater discharge to streams	-355	-188	-111	-93	-61	-43	-19	-1	-5	0	0	-2	0	-2	0	-10	-4	0	0	-2	-4	-4	0	0	0	0	0	-2	0
Riparian evapotranspiration	-52	-76	-37	-323	-6	-77	-2	-1	-129	0	-306	-427	-472	-531	-496	-617	-204	-685	-463	-450	-601	-337	0	0	0	-387	-14	-503	-557
Quarry operations	-4,303	-861	0	0	0	0	0	0	0	0	-1,010	-1,605	-1,606	-977	-3,824	-57	-7	0	-1,983	-2,869	-2,089	-292	0	0	0	0	0	0	0
Total Outflow	-11,342	-7,495	-6,787	-9,126	-8,756	-8,909	-9,255	-8,451	-9,151	-9,756	-8,857	-7,404	-6,718	-5,592	-8,193	-4,857	-5,238	-5,687	-7,139	-7,681	-6,943	-3,560	-2,492	-2,950	-3,783	-3,745	-3,067	-2,926	-1,924
Storage Change (AFY)																													
Total Inflows minus Total Outflows	-10,000	-2,077	-2,395	9,719	-7,448	-42	-8,084	-7,363	3,761	-9,017	-7,688	-2,909	-5,990	-766	-7,344	17,724	-2,087	-4,741	-6,256	-5,015	562	5,856	-1,531	-2,058	-2,679	-2,633	-2,282	4,705	-1,028

Notes:

[1]: Water year types are described in Section 5 - Water Budget, and shown on Figure 5-1. Water year types are summarized above as follows D = Dry, Below Normal = BN, N = Normal, AN = Above Normal, W = Wet.

Bedford Management Area Detailed Annual Water Budget, Baseline Period

	Water Year																								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Inflows																									
Subsurface inflow	71	88	83	91	91	77	91	90	84	92	84	88	63	83	91	91	84	80	79	91	91	92	92	92	80
Percolation from streams	3,730	1,440	2,389	1,070	887	2,923	1,004	798	2,282	652	1,843	624	4,284	1,682	1,082	934	1,276	2,744	2,732	1,013	780	594	494	397	2,556
Bedrock inflow	1008	1008	1007	1010	1012	905	846	653	613	668	518	377	788	1015	973	918	877	628	699	819	823	819	624	270	313
Dispersed recharge: non-irrigated land	3,642	330	1,510	205	280	2,393	218	300	811	46	957	199	4,625	534	-6	23	418	1,529	2,081	289	160	228	378	193	1,524
Dispersed recharge: irrigated land	1,137	424	757	372	433	897	334	424	572	262	692	374	1,507	521	260	245	500	762	897	362	303	387	437	383	735
Pipe leaks	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46	46
Reclaimed water percolation	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856
Quarry recharge	107	151	128	173	185	118	167	184	159	194	159	194	82	136	183	194	182	133	110	168	189	199	195	205	152
Total Inflow	11,597	5,341	7,775	4,823	4,791	9,214	4,562	4,351	6,421	3,816	6,155	3,758	13,251	5,873	4,485	4,308	5,238	7,777	8,499	4,645	4,248	4,220	4,121	3,442	7,263
Outflows																									
Subsurface outflow	-514	-494	-558	-439	-369	-571	-461	-358	-442	-344	-416	-317	-654	-638	-442	-364	-388	-564	-662	-504	-411	-364	-343	-309	-466
Wells - M&I and domestic	-1,310	-1,307	-1,309	-1,305	-1,303	-1,312	-1,305	-1,304	-1,306	-1,303	-1,306	-1,303	-1,313	-1,309	-1,303	-1,302	-1,304	-1,309	-1,310	-1,305	-1,303	-1,303	-1,303	-1,302	-1,307
Wells - agricultural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater discharge to streams	-1,479	-1,284	-1,407	-1,008	-795	-1,351	-957	-632	-806	-580	-614	-429	-1,990	-1,632	-1,051	-865	-773	-1,051	-1,457	-963	-718	-507	-372	-244	-559
Riparian evapotranspiration	-1,125	-828	-992	-766	-685	-1,005	-751	-587	-643	-508	-615	-467	-1,455	-1,012	-701	-532	-568	-811	-1,061	-767	-601	-533	-456	-378	-606
Quarry outflow	-2,911	-2,546	-2,647	-2,358	-2,220	-2,652	-2,392	-2,225	-2,383	-2,179	-2,293	-2,152	-2,934	-2,667	-2,320	-2,161	-2,183	-2,577	-2,767	-2,400	-2,207	-2,094	-2,065	-2,015	-2,363
Total Outflow	-7,339	-6,459	-6,913	-5,876	-5,373	-6,891	-5,867	-5,106	-5,580	-4,914	-5,245	-4,668	-8,346	-7,258	-5,817	-5,225	-5,216	-6,312	-7,257	-5,939	-5,240	-4,801	-4,538	-4,247	-5,300
Storage change																									
Inflows - outflows	4,258	-1,118	862	-1,053	-582	2,323	-1,305	-754	841	-1,099	910	-910	4,905	-1,385	-1,332	-917	22	1,465	1,243	-1,294	-991	-581	-417	-805	1,963

	Water Year																								
	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
Inflows																									
Subsurface inflow	71	87	83	95	103	77	102	111	98	120	100	110	65	103	149	160	139	113	103	154	171	173	166	161	121
Percolation from streams	3,528	1,486	2,433	1,256	1,053	3,052	1,088	992	2,460	713	2,082	781	4,461	1,783	1,141	981	1,531	2,849	2,844	1,078	837	666	592	473	2,704
Bedrock inflow	720	981	1168	1281	1131	918	855	663	623	681	528	384	802	1031	985	931	884	628	699	833	837	835	636	274	318
Dispersed recharge: non-irrigated land	3,601	330	1,510	205	291	2,507	232	333	844	51	1,018	226	4,753	563	0	27	444	1,623	2,147	302	166	241	389	202	1,584
Dispersed recharge: irrigated land	1,133	423	757	372	434	895	334	424	572	261	692	374	1,507	520	260	245	502	760	897	362	304	387	437	383	737
Pipe leaks	46	46	46	43	29	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	13
Reclaimed water percolation	1,856	1,856	1,856	1,856	1,887	1,897	1,897	1,897	1,887	1,897	1,897	1,897	1,887	1,897	1,897	1,897	1,887	1,897	1,897	1,687	1,887	1,897	1,897	1,897	1,887
Quarry recharge	99	150	126	167	182	116	169	184	156	196	158	193	78	137	186	197	178	133	111	175	193	201	195	206	152
Total Inflow	11,053	5,359	7,978	5,275	5,110	9,477	4,691	4,618	6,655	3,934	6,488	3,979	13,566	6,047	4,631	4,452	5,581	8,018	8,712	4,607	4,409	4,415	4,325	3,609	7,516
Outflows																									
Subsurface outflow	-674	-587	-655	-545	-485	-681	-557	-450	-564	-441	-532	-421	-769	-733	-492	-400	-467	-648	-746	-546	-434	-387	-384	-353	-534
Wells - M&I and domestic	-1,313	-1,307	-1,309	-1,310	-1,325	-1,333	-1,327	-1,326	-1,328	-1,325	-1,329	-1,325	-1,334	-1,330	-1,325	-1,324	-1,325	-1,330	-1,332	-1,340	-1,324	-1,325	-1,325	-1,324	-1,328
Wells - agricultural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater discharge to streams	-1,690	-1,354	-1,543	-1,221	-965	-1,519	-1,048	-722	-893	-641	-698	-510	-2,202	-1,722	-1,113	-919	-839	-1,151	-1,566	-1,032	-777	-562	-419	-275	-618
Riparian evapotranspiration	-1,233	-859	-1,044	-851	-767	-1,091	-795	-628	-688	-538	-656	-503	-1,546	-1,048	-724	-548	-601	-850	-1,106	-790	-622	-554	-476	-396	-639
Quarry outflow	-2,855	-2,578	-2,669	-2,427	-2,340	-2,763	-2,481	-2,314	-2,475	-2,257	-2,401	-2,245	-3,030	-2,729	-2,389	-2,233	-2,285	-2,669	-2,854	-2,274	-2,257	-2,165	-2,150	-2,104	-2,464
Total Outflow	-7,764	-6,685	-7,220	-6,354	-5,882	-7,388	-6,208	-5,440	-5,948	-5,200	-5,617	-5,005	-8,880	-7,562	-6,044	-5,425	-5,517	-6,649	-7,604	-5,981	-5,414	-4,992	-4,755	-4,451	-5,583
Storage change																									
Inflows - outflows	3,289	-1,326	758	-1,078	-772	2,090	-1,517	-823	707	-1,267	872	-1,026	4,686	-1,515	-1,413	-973	64	1,369	1,108	-1,375	-1,006	-577	-429	-842	1,933

Coldwater Management Area Detailed Annual Water Budget, Baseline Period

	Water Year																								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Inflows																									
Subsurface inflow	145	108	104	85	82	98	78	72	77	65	76	70	105	62	33	25	35	51	56	24	11	10	16	22	44
Percolation from streams	12,463	227	5,176	50	121	7,522	0	323	3,482	0	3,533	137	15,268	549	0	0	756	5,882	7,535	0	0	57	55	79	5,447
Bedrock inflow	572	573	571	577	580	530	490	386	366	429	369	301	504	658	638	579	549	428	418	493	499	477	356	134	148
Dispersed recharge: non-irrigated land	1,659	560	1,891	414	520	2,833	405	529	1,111	199	1,314	408	5,339	811	148	168	683	1,917	2,522	489	337	447	606	410	1,892
Dispersed recharge: irrigated land	617	213	396	183	214	476	168	215	292	129	355	186	814	265	126	121	256	394	476	182	147	189	230	186	388
Pipe leaks	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Quarry runoff recharge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inflow	15,481	1,707	8,163	1,334	1,540	11,485	1,165	1,550	5,353	848	5,671	1,127	22,054	2,371	970	919	2,303	8,696	11,031	1,215	1,019	1,205	1,287	857	7,943
Outflows																									
Subsurface outflow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1
Wells - M&I and domestic	-2,975	-2,980	-2,981	-2,981	-2,979	-2,980	-2,980	-2,981	-2,980	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,981	-2,980	-2,981	-2,981	-2,981
Wells - agricultural	-34	-43	-29	-48	-47	-34	-48	-42	-34	-51	-29	-45	-23	-34	-48	-39	-40	-34	-28	-40	-51	-48	-47	-46	-40
Groundwater discharge to streams	-7	0	-3	0	0	-6	0	0	-1	0	-1	0	-11	-2	0	0	0	-3	-3	0	0	0	0	0	-1
Riparian evapotranspiration	-153	-146	-151	-157	-165	-153	-155	-151	-139	-147	-149	-151	-164	-140	-145	-133	-141	-155	-145	-155	-154	-165	-158	-165	-168
Quarry operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Outflow	-3,169	-3,169	-3,162	-3,185	-3,192	-3,174	-3,183	-3,173	-3,155	-3,179	-3,159	-3,177	-3,178	-3,156	-3,174	-3,152	-3,162	-3,173	-3,157	-3,176	-3,185	-3,193	-3,186	-3,193	-3,190
Storage change																									
Inflows - outflows	12,312	-1,462	5,000	-1,852	-1,652	8,311	-2,018	-1,623	2,198	-2,331	2,512	-2,050	18,876	-786	-2,203	-2,233	-859	5,523	7,874	-1,961	-2,166	-1,989	-1,898	-2,335	4,753

	Water Year																								
	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
Inflows																									
Subsurface inflow	65	26	20	0	0	16	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0
Percolation from streams	12,343	227	5,267	50	130	7,875	0	354	3,649	0	3,689	164	15,626	596	0	0	817	6,062	7,688	0	0	72	64	91	5,587
Bedrock inflow	382	558	675	774	669	525	484	380	359	424	363	295	500	657	636	577	545	422	413	490	494	473	351	127	141
Dispersed recharge: non-irrigated land	4,139	561	1,891	414	526	2,934	406	550	1,132	192	1,363	423	5,454	827	141	160	698	1,999	2,576	491	331	448	604	407	1,940
Dispersed recharge: irrigated land	615	212	396	183	214	477	168	215	293	129	355	186	814	265	126	121	257	393	476	182	147	189	230	186	388
Pipe leaks	25	25	25	24	15	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5
Quarry runoff recharge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inflow	17,571	1,609	8,274	1,444	1,553	11,833	1,064	1,505	5,439	751	5,776	1,073	22,428	2,350	910	864	2,322	8,881	11,158	1,169	979	1,188	1,255	817	8,062
Outflows																									
Subsurface outflow	0	0	0	-3	-10	0	-9	-20	-13	-27	-14	-20	0	-18	-56	-67	-54	-32	-22	-61	-77	-80	-73	-69	-42
Wells - M&I and domestic	-2,981	-2,981	-2,981	-2,991	-3,027	-3,032	-3,032	-3,032	-3,027	-3,032	-3,032	-3,032	-3,026	-3,032	-3,032	-3,032	-3,027	-3,032	-3,032	-3,032	-3,027	-3,032	-3,032	-3,032	-3,027
Wells - agricultural	-34	-43	-29	-48	-47	-34	-48	-42	-34	-51	-29	-45	-23	-34	-48	-39	-40	-34	-28	-40	-51	-48	-47	-46	-40
Groundwater discharge to streams	-7	0	-3	0	0	-6	0	0	-1	0	-1	0	-11	-2	0	0	0	-3	-3	0	0	0	0	0	-2
Riparian evapotranspiration	-163	-146	-151	-158	-169	-155	-158	-154	-142	-149	-152	-154	-167	-142	-148	-135	-144	-157	-148	-158	-157	-167	-161	-168	-170
Quarry operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Outflow	-3,184	-3,169	-3,164	-3,200	-3,253	-3,227	-3,246	-3,246	-3,217	-3,259	-3,227	-3,251	-3,228	-3,228	-3,283	-3,272	-3,265	-3,258	-3,234	-3,290	-3,312	-3,327	-3,313	-3,316	-3,280
Storage change																									
Inflows - outflows	14,387	-1,560	5,110	-1,757	-1,701	8,606	-2,182	-1,741	2,222	-2,508	2,549	-2,178	19,200	-878	-2,373	-2,408	-943	5,623	7,925	-2,122	-2,333	-2,139	-2,058	-2,499	4,781

Bedford Management Area Detailed Annual Water Budget, Growth And Climate Change 50-year Period

	Water Year																								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Inflows																									
Subsurface inflow	71	88	83	91	91	77	91	90	84	92	84	88	63	83	91	91	84	80	79	91	91	92	92	93	80
Percolation from streams	3,665	1,462	2,266	1,210	1,052	2,841	1,111	1,036	2,180	824	1,824	863	4,146	1,641	1,097	950	1,486	2,586	2,612	1,153	912	760	744	565	2,399
Bedrock inflow	1082	1081	1080	1083	1085	965	885	712	696	764	605	469	822	1005	943	903	868	686	751	861	871	870	692	359	402
Dispersed recharge: non-irrigated land	3,604	493	1,685	331	416	2,439	282	484	1,064	42	1,150	313	4,474	617	-16	18	592	1,619	2,304	372	175	319	530	269	1,705
Dispersed recharge: irrigated land	1,854	743	1,229	675	751	1,409	596	756	998	495	1,115	686	2,354	814	491	463	869	1,267	1,455	619	545	689	743	706	1,193
Pipe leaks	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119
Reclaimed water percolation	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139	2,139
Quarry recharge	299	456	409	490	510	380	486	512	472	528	475	523	304	432	518	542	513	416	370	488	528	515	529	542	448
Total Inflow	12,833	6,581	9,009	6,138	6,163	10,368	5,709	5,848	7,752	5,003	7,511	5,201	14,422	6,851	5,383	5,226	6,670	8,912	9,829	5,843	5,381	5,503	5,588	4,793	8,486
Outflows																									
Subsurface outflow	-453	-429	-448	-372	-298	-485	-402	-281	-341	-276	-304	-244	-589	-563	-370	-280	-309	-461	-556	-444	-329	-246	-246	-222	-351
Wells - M&I and domestic	-1,895	-1,883	-1,884	-1,880	-1,882	-1,888	-1,881	-1,879	-1,881	-1,879	-1,880	-1,882	-1,891	-1,884	-1,879	-1,878	-1,878	-1,883	-1,886	-1,880	-1,878	-1,879	-1,878	-1,878	-1,882
Wells - agricultural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater discharge to streams	-1,730	-1,637	-1,835	-1,396	-1,142	-1,831	-1,316	-997	-1,283	-940	-1,032	-817	-2,581	-2,046	-1,284	-1,049	-1,067	-1,467	-1,973	-1,356	-1,038	-819	-726	-548	-957
Riparian evapotranspiration	-1,388	-1,055	-1,315	-972	-895	-1,375	-952	-791	-905	-691	-891	-697	-2,041	-1,289	-828	-626	-730	-1,122	-1,487	-969	-758	-707	-648	-570	-922
Quarry outflow	-2,866	-2,504	-2,595	-2,405	-2,321	-2,658	-2,408	-2,322	-2,420	-2,292	-2,358	-2,289	-2,885	-2,590	-2,348	-2,244	-2,301	-2,562	-2,705	-2,415	-2,288	-2,237	-2,213	-2,197	-2,427
Total Outflow	-8,332	-7,508	-8,078	-7,025	-6,538	-8,238	-6,959	-6,270	-6,830	-6,078	-6,466	-5,929	-9,987	-8,373	-6,709	-6,076	-6,284	-7,496	-8,607	-7,063	-6,292	-5,889	-5,712	-5,416	-6,538
Storage change																									
Inflows - outflows	4,501	-927	932	-888	-375	2,130	-1,250	-422	922	-1,074	1,045	-728	4,435	-1,522	-1,325	-849	385	1,416	1,223	-1,220	-910	-386	-123	-623	1,948
MODFLOW	4,501	-927	932	-888	-375	2,130	-1,250	-422	922	-1,074	1,045	-728	4,435	-1,522	-1,325	-849	385	1,416	1,223	-1,220	-910	-386	-123	-623	1,948

	Water Year																								
	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
Inflows																									
Subsurface inflow	71	87	83	91	93	77	93	92	85	98	85	90	65	85	130	142	112	86	81	131	149	149	138	129	88
Percolation from streams	3,300	1,540	2,299	1,350	1,250	3,023	1,175	1,253	2,343	877	2,078	1,046	4,413	1,838	1,154	989	1,722	2,727	2,762	1,199	954	847	869	705	2,579
Bedrock inflow	790	1046	1219	1319	1185	981	903	722	700	772	615	478	832	1022	962	919	882	681	746	874	878	880	698	360	402
Dispersed recharge: non-irrigated land	3,547	493	1,685	332	437	2,567	302	540	1,116	54	1,238	360	4,609	661	-4	28	639	1,734	2,395	394	187	342	551	287	1,781
Dispersed recharge: irrigated land	1,848	747	1,229	675	753	1,404	596	756	1,001	492	1,115	686	2,355	813	491	463	873	1,261	1,455	619	546	688	743	706	1,195
Pipe leaks	119	119	119	113	84	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	50
Reclaimed water percolation	2,139	2,139	2,139	2,139	2,176	2,197	2,197	2,197	2,176	2,197	2,197	2,197	2,176	2,197	2,197	2,197	2,176	2,197	2,197	2,197	2,176	2,197	2,197	2,197	2,176
Quarry recharge	330	454	406	486	512	380	495	517	471	540	475	529	294	439	529	554	512	419	372	498	540	553	539	550	451
Total Inflow	12,145	6,625	9,178	6,507	6,490	10,683	5,815	6,131	7,948	5,086	7,858	5,441	14,800	7,109	5,514	5,347	6,972	9,161	10,064	5,967	5,485	5,712	5,790	4,990	8,722
Outflows																									
Subsurface outflow	-585	-524	-544	-487	-438	-600	-511	-394	-471	-389	-431	-369	-713	-681	-448	-334	-401	-571	-666	-509	-372	-315	-315	-299	-475
Wells - M&I and domestic	-1,892	-1,883	-1,884	-1,888	-1,910	-1,919	-1,911	-1,910	-1,910	-1,909	-1,911	-1,913	-1,926	-1,915	-1,909	-1,908	-1,906	-1,914	-1,917	-1,911	-1,906	-1,908	-1,908	-1,909	-1,910
Wells - agricultural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Groundwater discharge to streams	-2,266	-1,803	-2,006	-1,640	-1,352	-2,037	-1,413	-1,100	-1,384	-1,004	-1,133	-903	-2,817	-2,166	-1,360	-1,101	-1,150	-1,577	-2,083	-1,422	-1,082	-880	-800	-614	-1,048
Riparian evapotranspiration	-1,763	-1,143	-1,391	-1,059	-987	-1,462	-988	-832	-949	-715	-928	-734	-2,140	-1,338	-850	-640	-765	-1,173	-1,534	-992	-776	-723	-672	-599	-960
Quarry outflow	-2,831	-2,532	-2,616	-2,440	-2,407	-2,749	-2,481	-2,402	-2,494	-2,353	-2,450	-2,370	-2,969	-2,659	-2,416	-2,311	-2,375	-2,639	-2,795	-2,479	-2,337	-2,288	-2,289	-2,275	-2,508
Total Outflow	-9,336	-7,884	-8,441	-7,514	-7,093	-8,767	-7,304	-6,637	-7,209	-6,371	-6,854	-6,288	-10,566	-8,759	-6,983	-6,294	-6,597	-7,874	-8,995	-7,312	-6,474	-6,114	-5,985	-5,695	-6,901
Storage change																									
Inflows - outflows	2,808	-1,259	738	-1,007	-603	1,916	-1,489	-506	740	-1,285	1,004	-848	4,234	-1,650	-1,469	-947	375	1,286	1,068	-1,345	-989	-402	-195	-705	1,821
MODFLOW	2,808	-1,259	738	-1,007	-603	1,916	-1,489	-506	740	-1,285	1,004	-848	4,234	-1,650	-1,469	-947	375	1,286	1,068	-1,345	-989	-402	-195	-705	1,821

Coldwater Management Area Detailed Annual Water Budget, Growth And Climate Change 50-year Period

	Water Year																								
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043
Inflows																									
Subsurface inflow	154	122	123	103	100	120	95	92	102	85	97	91	127	81	48	40	58	74	78	44	30	30	40	49	73
Percolation from streams	12,454	227	5,175	49	120	7,516	0	323	3,480	0	3,529	136	15,254	545	0	0	755	5,875	7,530	0	0	57	52	77	5,439
Bedrock inflow	550	551	548	554	557	505	459	357	350	421	370	310	491	608	560	497	455	362	380	466	472	454	334	123	134
Dispersed recharge: non-irrigated land	1,617	1,003	2,451	804	941	3,294	716	992	1,713	420	1,860	793	5,839	1,170	360	374	1,177	2,413	3,194	819	579	804	1,038	771	2,448
Dispersed recharge: irrigated land	832	304	533	273	297	624	232	319	420	187	475	277	1,060	332	186	178	354	544	636	244	212	274	305	275	521
Pipe leaks	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48	48
Quarry runoff recharge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inflow	15,655	2,254	8,878	1,830	2,063	12,107	1,550	2,131	6,113	1,161	6,379	1,655	22,819	2,784	1,203	1,137	2,847	9,315	11,867	1,620	1,341	1,667	1,818	1,344	8,664
Outflows																									
Subsurface outflow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	-1
Wells - M&I and domestic	-3,048	-3,049	-3,061	-3,044	-3,044	-3,062	-3,040	-3,050	-3,061	-3,048	-3,056	-3,045	-3,067	-3,054	-3,045	-3,047	-3,056	-3,051	-3,067	-3,044	-3,040	-3,042	-3,049	-3,040	-3,051
Wells - agricultural	-78	-87	-73	-103	-103	-67	-106	-96	-68	-95	-72	-97	-61	-82	-98	-96	-78	-83	-61	-102	-105	-109	-91	-111	-89
Groundwater discharge to streams	-6	0	-2	0	0	-5	0	0	-1	0	-1	0	-10	-2	0	0	0	-3	-3	0	0	0	0	0	-1
Riparian evapotranspiration	-166	-161	-165	-170	-181	-168	-172	-165	-151	-162	-164	-165	-179	-153	-159	-144	-154	-170	-160	-170	-169	-180	-172	-180	-183
Quarry operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Outflow	-3,298	-3,297	-3,302	-3,317	-3,327	-3,301	-3,318	-3,310	-3,281	-3,304	-3,293	-3,308	-3,317	-3,291	-3,302	-3,287	-3,288	-3,307	-3,291	-3,316	-3,313	-3,331	-3,312	-3,332	-3,325
Storage change																									
Inflows - outflows	12,357	-1,043	5,577	-1,487	-1,264	8,806	-1,768	-1,180	2,831	-2,143	3,086	-1,653	19,502	-507	-2,099	-2,151	-441	6,008	8,575	-1,695	-1,972	-1,664	-1,495	-1,989	5,339
MODFLOW	12,357	-1,882	3,903	-2,191	-2,092	6,602	-2,416	-1,958	1,646	-2,544	1,739	-2,326	15,694	-1,455	-2,450	-2,509	-1,323	4,384	6,423	-2,426	-2,506	-2,362	-2,409	-2,661	3,627

	Water Year																								
	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
Inflows																									
Subsurface inflow	89	45	43	18	12	39	9	4	16	0	11	5	51	2	0	0	0	0	3	0	0	0	0	0	0
Percolation from streams	12,334	226	5,265	48	130	7,878	0	361	3,650	0	3,684	168	15,608	605	0	0	823	6,060	7,681	0	0	72	65	94	5,587
Bedrock inflow	353	523	637	729	632	499	455	350	343	416	366	305	488	607	559	494	451	357	376	463	468	450	329	116	128
Dispersed recharge: non-irrigated land	4,637	1,007	2,451	803	951	3,395	712	1,024	1,743	407	1,924	816	5,951	1,189	348	359	1,202	2,502	3,262	816	565	803	1,035	764	2,497
Dispersed recharge: irrigated land	828	304	533	273	297	623	232	319	421	186	475	277	1,060	332	186	178	356	540	636	244	215	274	305	275	521
Pipe leaks	48	48	48	44	26	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Quarry runoff recharge	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Inflow	18,289	2,153	8,977	1,916	2,048	12,442	1,417	2,067	6,181	1,017	6,468	1,579	23,167	2,743	1,101	1,040	2,840	9,467	11,966	1,531	1,256	1,608	1,743	1,258	8,740
Outflows																									
Subsurface outflow	0	0	0	0	0	0	0	0	0	-5	0	0	0	0	-37	-49	-27	-5	0	-38	-56	-56	-45	-38	-8
Wells - M&I and domestic	-3,057	-3,049	-3,061	-3,055	-3,091	-3,115	-3,093	-3,104	-3,109	-3,101	-3,109	-3,098	-3,115	-3,107	-3,098	-3,100	-3,104	-3,104	-3,120	-3,097	-3,088	-3,096	-3,102	-3,093	-3,099
Wells - agricultural	-72	-87	-73	-103	-103	-67	-106	-96	-68	-95	-72	-97	-61	-82	-98	-96	-78	-83	-61	-102	-105	-108	-91	-111	-89
Groundwater discharge to streams	-6	0	-2	0	0	-6	0	0	-1	0	-1	0	-10	-2	0	0	0	-3	-3	0	0	0	0	0	-2
Riparian evapotranspiration	-177	-160	-166	-171	-184	-170	-175	-167	-154	-164	-167	-168	-183	-155	-162	-147	-157	-172	-163	-173	-172	-182	-176	-184	-186
Quarry operations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Outflow	-3,312	-3,296	-3,303	-3,329	-3,379	-3,357	-3,374	-3,366	-3,332	-3,364	-3,349	-3,364	-3,369	-3,346	-3,395	-3,392	-3,366	-3,368	-3,347	-3,410	-3,421	-3,443	-3,414	-3,426	-3,383
Storage change																									
Inflows - outflows	14,978	-1,143	5,675	-1,413	-1,331	9,086	-1,957	-1,299	2,849	-2,347	3,119	-1,784	19,799	-603	-2,294	-2,352	-526	6,100	8,619	-1,879	-2,165	-1,835	-1,671	-2,168	5,357
MODFLOW	11,943	-1,985	4,001	-2,116	-2,161	6,835	-2,595	-2,090	1,655	-2,730	1,742	-2,465	15,944	-1,556	-2,629	-2,692	-1,412	4,435	6,446	-2,601	-2,682	-2,525	-2,575	-2,827	3,628

APPENDIX I

Bedford-Coldwater GSP Data Management System Description

TODD GROUNDWATER

May 19, 2021

TECHNICAL MEMORANDUM

To: Victor Harris, H&H Water Resources
From: Maureen Reilly, PE and Chad Taylor, PG, CHG
Re: Data Management System (DMS) Documentation, Bedford-Coldwater Groundwater Sustainability Plan

1. EXECUTIVE SUMMARY

The Bedford Coldwater Groundwater Basin Agency (BCGSA) was formed by the City of Corona (Corona), Elsinore Valley Municipal Water District (EVMWD), and Temescal Valley Water District (TVWD) through a Joint Powers Authority (JPA) to fulfill the role and legal obligations of a Groundwater Sustainable Agency (GSA) for the Bedford-Coldwater Subbasin (Basin) of the Elsinore Valley Groundwater Basin in accordance with the Sustainable Groundwater Management Act (SGMA). Foremost among the responsibilities is to develop, adopt, and implement a Groundwater Sustainability Plan (GSP) for the Basin.

As part of GSP development, the BCGSA has compiled data from various sources that are relevant to groundwater, geology, and water supply the Basin. These data focus on information that have been required and useful for the preparation of the GSP. The purpose of this Technical Memorandum (TM) is to document the Data Management System (DMS) developed as part of the GSP.

Corona, EVMWD, and TVWD have been collecting and compiling groundwater data including water levels, water quality, and water use for the GSP. As part of the GSP, the DMS has been redesigned to be practicable, usable, intuitive, and cost effective. The data (and data from the BCGSA and other sources) are being compiled in an Access database, geographic information system (GIS) geodatabase, and Excel workbooks. This DMS has been prepared to facilitate queries and other means of quickly checking and summarizing data and extracting relevant information for GSP preparation. This memo outlines the type of data available in the DMS and details how the data are stored. More information on available data is documented in the technical memorandum, “Bedford-Coldwater Basin Existing Data Transmittal” (Todd 2019).

2. DMS TYPES AND SOURCES

Data collected and compiled for the GSP have been stored in a variety of formats based on the type of data collected. Spatial information such as ArcGIS files, aerial imagery, and or other map sources, are stored in a Geodatabase. Tabular data are stored in subject-specific relational databases. Additional datasets are stored in files best suited for analysis. To be specific, climate data are stored in an Excel workbook to allow for cumulative departure calculations, scanned well documents are stored as images to preserve the detail on the hardcopy forms, and online datasets updated by other agencies are included by reference. Discussed below are the data formats and the type of data available within that format.

3. GEODATABASE

Spatial data are stored in a geodatabase, which allows spatial files to be easily accessed and transferred with all appropriate spatial information. Within the BC Geodatabase, consistent and feature dataset structures have been constructed to group associated data sets and maintain coordinate system assignments.

3.1 Jurisdiction Boundaries

The basin boundaries for the Bedford-Coldwater Basin, management areas, and neighboring basins are available as spatial coverages in the geodatabase. State, local, and federal boundaries within and surrounding the Bedford-Coldwater Basin were compiled from state and federal sources. These boundaries include all water districts and other local agencies near the basin as well as federally owned land. These boundaries are included in the *JurisdictionalAreas* feature dataset in the project geodatabase.

3.2 Surface Water Body Location and Watershed Mapping

Mapping data for surface water features have been provided from publicly available sources. These mapped data include locations of aqueducts, reservoirs, rivers, streams, drainages, lakes, and ponds. These data are presented in the project geodatabase in feature classes named *HydrologyArcs,* and *HydrologyPolygons*. DWR defined watershed coverages are also stored in the ArcHydro geodatabase names *Watershed*.

3.3 Mapping of Natural Communities Commonly Associated with Groundwater

GSP Regulations require identification of Groundwater Dependent Ecosystems (GDEs), which are defined as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. A statewide database and mapping tool, developed by DWR, provides geographic information on Natural Communities Commonly Associated with Groundwater (NCAAG). While these do not necessarily represent GDEs, the dataset is a starting point in identifying GDEs. The mapping data for watersheds surrounding the Basin are included in the project geodatabase in the *Hydrology* feature dataset in feature classes named *GDE_NCCAGWetlands* and *GDE_NCCAGVegetation*.

3.4 Ground Surface Elevation Data

Ground surface elevation data are available from the USGS in the form of National Elevation Dataset (NED) GIS grid files (rasters) and raster and vector topographic map datasets. Both datasets have been compiled for the area surrounding and including the Basin. The 10-meter resolution NED data have been combined into a single raster.

3.5 Aerial Photographs

Aerial photographs of the area surrounding the Basin have been downloaded from the USGS National Aerial Imagery Program (NAIP) for 2004, 2005, 2006, 2009, 2010, 2012, 2014, and 2016. Selected historical aerial imagery of the Temescal Wash area from Google Earth and privately held aerial imagery archives have also been acquired. These aerial photographs are rectified GIS raster datasets whenever possible. Rectified GIS datasets are included in the project geodatabase, unrectified aerial imagery is stored separately.

3.6 Soil Maps

Soil information for the Basin and surrounding areas have been downloaded from the Natural Resources Conservation Service (NRCS 2018). Soil data are mapped and maintained by NRCS in a standardized format that is compatible with tools that NRCS makes freely available to the public. The soils data for the area surrounding the basin have been maintained in the standard NRCS formats to facilitate future use. These raw data are available for preparation of a various soil data presentations and analyses. The hydrologic soil group data from these datasets have been also mapped using the NRCS *Soil Data Development Toolbox.* These data are in the *Soils* feature dataset in the project geodatabase.

3.7 Land Use Maps

Land use map data have been collected from DWR, the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP), and Riverside County. The available land use maps are indicated below:

- DWR: 2014 statewide land use mapping specifically developed for SGMA and GSPs.
- FMMP: 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, and 2016
- Riverside County: 1993 and 2000

3.8 Geologic Mapping of Surficial Geology and Faults

Surficial geology in the area of the Bedford-Coldwater Basin has been mapped by the United States Geological Survey (USGS) in the 2004 *Preliminary Digital Geologic Map of the Santa Ana 30' x 60' Quadrangle* and the 2006 *Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangles*. This mapped geology has been digitized into GIS formats available from the USGS, and these complete datasets are included in the *Geology* feature dataset of the project geodatabase.

3.9 Subsidence - NASA JPL InSAR Dataset

Vertical ground surface displacement rates are derived from Interferometric Synthetic Aperture Radar (InSAR) data collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), under contract with DWR. Changes in vertical displacement can be viewed through the DWR SGMA mapping tool. Data have been downloaded from the SGMA data viewer and stored in the project geodatabase.

3.10 Water Infrastructure

3.10.1 Imported Water

Imported water delivery pipelines and tie-in locations available from Corona, EVMWD, and TVWD are included in the GIS datasets in the *MunicipalWaterInfrastructure* feature dataset in the project geodatabase. TVWD did not provide pipeline location details but did indicate that imported water is delivered throughout their service area. Imported water delivery data are included in the *Corona Imported Water*, *EVMWD Imported Water*, and *TVWD Imported Water* tables in the project database.

3.10.2 Recycled Water and Wastewater

Corona and TVWD supplied waste discharge and recycled water use records and distribution locations. EVMWD does not deliver recycled water or discharge wastewater within the basin. Corona waste discharge and recycled water distribution and use locations are included in the GIS datasets in the *MunicipalWaterInfrastructure* feature dataset in the project geodatabase. TVWD waste discharge historically went either to Temescal Creek or ponds adjacent to their wastewater treatment facility and they provide recycled water throughout the Bedford portion of the basin and waste discharge. Recycled water use and wastewater discharge data are included in the *Corona Reclaimed Water Use*, *Corona Waste Discharge*, *TVWD All Waste Discharge*, and *TVWD Waste Discharge by Location* tables in the project database.

3.11 Climate Data

The CIMIS stations, NOAA stations, and other climate locations are available in the geodatabase as a point coverage. In addition, the PRISM isohyets are available as a raster.

3.12 Surface Water Gage Locations

The locations of USGS surface water gages are also stored in the Geodatabase. Three streamflow gage stations near the Bedford-Coldwater Basin that are maintained by the USGS were identified. These stations are located on Temescal Creek at about Main Street in Corona (USGS 11072100), Temescal Creek at Corona Lake (USGS 11071900), and San Jacinto River near Elsinore (USGS 11070500). Up to date surface water measurements are available from the USGS NWIS data repository.

4. ACCESS DATABASES

Tabular data are linked in relational databases by subject. The DMS include one access data base with stand-alone tables that pull together data from all sources for groundwater elevation, groundwater quality, and groundwater pumping. In addition, a table containing all know wells in Bedford-Coldwater links to the subject specific tables. The well table includes locational information as State Plane coordinates. These tables that include all sources of data are named with the prefix "ALL_". Additional tables from the individual agencies are included in the database for the records and are labels with the agency prefix (e.g. "EVMWD", "TVWD", "Corona"). Other tables are included to house subsets of data from other sources including the water master, EPA STORET, and data from outside the basin.

The types of data stored in the Access database are described below.

4.1 Well Information Table

Well locations and available information were collected from multiple sources, including previous investigations, USGS National Water Information System (NWIS), DWR California Groundwater Elevation Monitoring (CASGEM) program, and others. This data collection effort included available well locations, well construction information, and aquifer parameter information. Data from all the available sources for the basin and surrounding area were collected and reviewed and then the data were combined into a single unified dataset. The unified dataset retains detailed information from the source files. Well data from individual sources often use agency-specific identification numbers or names. This variation in identification number by source is problematic for organizing, relating, and querying data. A *UniqueID* field was added to the unified well dataset and assigned integer identification numbers for each well to serve as the primary field for joins, relating, and querying data. The unified well dataset includes wells with and without location data. In compiling these data, attempts were made to remove duplicate wells while compiling these data. In some cases of duplicate wells, it was not possible to determine which location is correct. In these instances, the duplicate records were maintained in the dataset. The unified well information dataset is included in the project database in the All_*Well Information Table* and the same information is presented in the project geodatabase in the *Well* feature class in the *Groundwater* feature dataset.

Well locations are not well tracked in California, and as a result it is always possible that wells are either completely missing from records or mis-located. While this is not a known data gap, there may be wells that are missing or mis-located in the data that has been compiled for this data collection task.

4.2 Groundwater Elevation Table

As with well locations, groundwater elevation records were collected from multiple sources, including previous investigations, Corona, USGS NWIS, DWR CASGEM, and others. Data from these sources were collected, reviewed, and compiled into a single unified groundwater elevation dataset. The dataset includes all information from each source and uses the *UniqueID* field for linking, joining, or relating to the *Well Information* table in the project database or *Well* feature class of the project geodatabase. Groundwater elevation data were not calculated for wells without reference elevation data; records for these wells include only depth to water measurements. In addition, there are temporal gaps in some of the data records between the completion of previous investigations and the start of data collection for publicly available records. This is discussed further in the data gaps section below.

Groundwater elevation data is presented in the *ALL_Groundwater Elevation Data* table of the project database, and this dataset has been structured according to the requirements of the CASGEM program in accordance with DWR's grant funding agreement with the BCGSA.

4.3 Groundwater Quality Table

The groundwater quality database combines water quality data from a variety of sources for a comprehensive repository of regional water quality data. The relational database includes locations for all wells with water quality data, a table of water quality data, a table with information on the water system that was sampled, and a table of constituents monitored with agency codes, reporting levels, and applicable water quality goals. Queries are included to extract data on the key constituents of concern. Data from all three agencies, regional monitoring (Regional Water Quality Control Board and the Division of Drinking Water), and special studies (SNMP) are included in the *All_Water_Quality* table. The wells are linked to the Well Information table by the Unique_ID and the source recorded in the dataset attribute field.

4.4 Groundwater Pumping Table

Groundwater production in the basin was compiled from all available sources in the table *ALL_BC_Annual_Pumping*. Annual groundwater pumping for all wells is tracked by the Santa Ana River Watermaster, along with production in the rest of the watershed. Western Municipal Water District (WMWD) currently coordinates groundwater use data collection. Complete records of historical groundwater use were requested from and provided by WMWD. These groundwater production data were reviewed and organized for inclusion in the project database in a table named Bedford-Coldwater Annual Pumping. These production records are related to well locations by the Unique ID in the *Well Information* and *Bedford-Coldwater Annual Pumping* tables.

Annual totals from the Watermaster were confirmed and monthly information included when available from each individual agency.

4.5 Aquifer Parameter and Well Construction Data

There are very few aquifer parameter estimates in and around the Bedford-Coldwater Basin. Some aquifer parameter estimates were collected and/or developed during preparation of the Corona Groundwater Management Plan (Todd 2008a) and the *Feasibility Study, Recycled*

Water Recharge, Bedford Subbasin (Todd 2008b). Most of the transmissivity and hydraulic conductivity parameter estimates from those studies were based on an empirical relationship between specific capacity and transmissivity wherein transmissivity is 1,500 times specific capacity in unconfined aquifers. However, there was a constant rate aquifer test performed on TVWD Well 1A with observations in TVWD Wells 3 and 4. The data from this test were analyzed as part of the *Feasibility Study, Recycled Water Recharge, Bedford Subbasin* (Todd 2008b). The TVWD Well 1A test data are included in excel workbooks in a directory named *Pumping Test Data* and a summary table of all available aquifer test data in included in the project database (*Well Construction + Aquifer Parameters*). The records in the *Well Construction + Aquifer Parameter* table relate to the *Well Information* table through the *UniqueID* fields.

4.6 Additional Water Sources

Additional data on imported water is stored as tables from the individual agencies in the Access database.

4.6.1 Imported Water

Corona, EVMWD, TVWD each use imported water and the measured data is stored in the database separate for each agency. There is no combined table for basin-wide imported water.

4.6.2 Recycled Water and Wastewater

Wastewater information from TVWD is stored in the database as *TVWD Waste Discharge by Location.* Corona's reclaimed water use by address is stored as a separate table, *Corona Reclaimed Water.*

5. OTHER FORMATS

5.1 Climate Data (precipitation, evaporation, temperature) - Excel

Climate data are compiled and stored as an Excel file. The workbook also calculates the cumulative departure of precipitation and local water year type by quintiles.

We identified three currently active climate monitoring stations near the Bedford-Coldwater Basin: the Lake Elsinore station maintained by the National Oceanic Atmospheric Administration (NOAA), the Santiago Peak station maintained by Orange County, and the UC Riverside California Irrigation Management Information System (CIMIS). The Lake Elsinore and UC Riverside stations include daily precipitation and evapotranspiration data; the Santiago Peak station collects monthly precipitation data. Monthly data for the Santiago Peak station is from January 1949 to current, with a slight lag on recent data. The Lake Elsinore station has daily data from January 1961 through current and the UC Riverside station has daily data from January 1986 through the present.

6. BEDFORD-COLDWATER GROUNDWATER MODEL

The groundwater model datasets prepared for the GSP are stored separately from the DMS. These data and files have been prepared using various datasets described above, as documented in the Bedford-Coldwater GSP Model Documentation Report (Todd 2021). The results of the historical and future model simulations are documented in the GSP. Model outputs including surface water budgets and groundwater budgets are also documented in detailed tables. While these data are valuable to understanding the basin, they represent simulated conditions and are stored separately from the observed data in the DMS which are documented here.

7. DATA MANAGEMENT STORAGE

The DMS will continue to be updated with more recent data for annual reports and the GSP 5-year update. It is expected that new datasets will be added as projects and management actions are enacted to fill data gaps. For example, shallow monitoring wells near Temescal Wash may be added at a later date.

The geodatabase, Access databases, and excel workbooks will be updated annually as part of the Annual GSP Report. The GSA will maintain a copy of the annually updated files.

Appendix U

Documentation on Recent Water Conservation Activity

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

January 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

3

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1530.8 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1749.15 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

425.80

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

201.41 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

76.54 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

83.85 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

80.28 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

34

18 See Click Fix related, 0 iEfficient app notices, two SWRCB Website Reporting, 14 emails in Stop the Drop or referred by other dept.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,321

Total of 1,281 calls per call records from IT Report for ext. 4965 (Tayler – 134 in, 208 out, 342 total, ext. 3768 (Haley – 294 in, 453 out, total 747) and ext. 3692 (Monica – 85 in, 107 out, 192 total). 12 direct contacts with customers (per automated Crossbow report from IT), 12 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 584 tier 5 calls (included in the total calls – 1,281), eight tier 5 emails and eight tier 5 site visits/audits. Tier 5 calls and emails included contact with HOAs, their property management companies and landscape maintenance companies.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

15

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5522

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In January 2016, a total 2,613 cusomters had water usaged charged in Tier 3 (inefficient use), 1,308 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,601 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard and a portion of these customers are contacted by phone to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In January 2016, Corona's Water Resources Team received 513 calls relating to water conservation questions, rebate programs and water waste with 768 outgoing calls. A total of 193 residential landscape checkup (water audits) appointments, five large landscape audits at commercial/industrial sites, seven commercial/industrial mixed meter audits, one multi-family residential audits (mixed use meter accounts) and two follow up site visits were completed, as well as sprinkler and timer adjustments or leak repairs at seven sites and the installation of water saving devices at 11 properties were completed. 23 sites were investigated for water waste by Water Resources Technician in January 2016. During the month there were two education events held and seven classroom presentations reaching 205 students. 145 bathroom aerators, 73 hose nozzles, 55 kitchen aerators, 89 showerheads, 180 toilet dye tablets, and 111 shower timers were delivered or provided to residential customers. 102 rebates were issued for residential customers and 53 commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

As the drought continues, the City of Corona remains committed and focused in its efforts to achieve unprecedented levels of water reduction. The accumulated reduction in water sales (customer consumption) from June 2015 through January 2016 is 23%.

UC Riverside CIMIS Station 44 data showed the average temperature in 1/2016 was 0.9 degrees higher compared to 1/2013. The average soil temperature was 1.8 degrees higher in 1/2016 compared to 1/2013 as well.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

February 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

3

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1791.83 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1650.11 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

350.90

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

183.23 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

89.59 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

62.05 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

74.33 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

24

15 See Click Fix related, 0 iEfficient app notices, zero SWRCB Website Reporting, 9 emails in Stop the Drop or referred by other dept.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,126

Total of 1,086 calls per call records from IT Report for ext. 4965 (Tayler – 97 in, 221 out, 318 total, ext. 3768 (Haley – 252 in, 318 out, total 570) and ext. 3692 (Monica – 68 in, 130 out, 198 total). 14 direct contacts with customers (per automated Crossbow report from IT), 18 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), eight tier 5 emails and zero tier 5 site visits/audits.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

15

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3043

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In February 2016, a total 1,532 customers had water usage charged in Tier 3 (inefficient use), 717 customers had water usage charged in Tier 4 (Excessive Water Use) and 794 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In February 2016, Corona's Water Resources Team received 417 calls relating to water conservation questions, rebate programs and water waste with 669 outgoing calls. A total of 110 residential landscape checkup (water audits) appointments, two large landscape audits at commercial/industrial sites, six commercial/industrial mixed meter audits, two multi-family residential audits (mixed use meter accounts) and one follow up site visit was completed, as well as sprinkler and timer adjustments or leak repairs at fifteen sites and the installation of water saving devices at seven properties were completed. 19 sites were investigated for water waste by Water Resources Technician in February 2016. During the month there were two education events held and six classroom presentations reaching 195 students. 89 bathroom aerators, 44 hose nozzles, 40 kitchen aerators, 83 showerheads, 97 toilet dye tablets, and 78 shower timers were delivered or provided to residential customers. 453 rebates were issued for residential customers and 492 commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

As the drought continues, the City of Corona remains committed and focused in its efforts to achieve unprecedented levels of water reduction. Residential usage decreased by 15% and CII usage decreased by 22%. The accumulated reduction in water sales (customer consumption) from June 2015 through February 2016 is 19%.

UC Riverside CIMIS Station 44 data showed the average temperature in 2/2016 was 9.7 degrees higher compared to 2/2013. The average soil temperature was 2.8 degrees higher in 2/2016 compared to 2/2013 as well. The ETo in 2/2013 was only 3.18 inches compared to 4.28 inches in 2/2016. Precipitation in 2/2016 was only 0.23 inches compared to 0.84 in 2/2013. The humidity in 2/2016 was 32%, 15% less than in 2/2013.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

March 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

3

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1885.655 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2416.5 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

390.80

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

234.75 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

94.28 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

62.12 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

73.26 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

35

16 See Click Fix related, 0 iEfficient app notices, zero SWRCB Website Reporting, 19 emails in Stop the Drop or referred by other dept.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,142

Total of 1,090 calls per call records from IT Report for ext. 4965 (Tayler – 76 in, 186 out, 262 total, ext. 3768 (Haley – 284 in, 457 out, total 741) and ext. 3692 (Monica – 42 in, 45 out, 87 total). 34 direct contacts with customers (per automated Crossbow report from IT), 4 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 104 tier 5 calls (included in the total calls), 14 tier 5 emails and no tier 5 site visits/audits.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

19

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1906

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In March 2016, a total of 1,011 customers had water usage charged in Tier 3 (inefficient use), 434 customers had water usage charged in Tier 4 (Excessive Water Use) and 461 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In March 2016, Corona's Water Resources Team received 402 calls relating to water conservation questions, rebate programs and water waste with 688 outgoing calls. A total of 226 residential landscape checkup (water audits) appointments, one large landscape audit at commercial/industrial sites, nine commercial/industrial mixed meter audits, one multi-family residential audits (mixed use meter accounts), one follow up site visit, as well as sprinkler and timer adjustments or leak repairs at 29 sites and the installation of water saving devices at two properties were completed. 18 sites were investigated for water waste by Water Resources Technician in March 2016. During the month there were seven education events held and three classroom presentations reaching 88 students, as well as 120 students at the Promenade Elementary Family Fun Science Night. 98 bathroom aerators, 46 hose nozzles, 36 kitchen aerators, 70 showerheads, 69 toilet dye tablets, and 78 shower timers were delivered or provided to residential customers. 578 rebates were issued for residential customers and 105 commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Overall water sales (direct customer consumption) decreased by 10% in March 2016 compared to 2013. Residential and CII usage decreased by 11%. The current accumulated reduction in water sales (customer consumption) from June 2015 through March 2016 is 19%.

UC Riverside CIMIS Station 44 data showed the average temperature in 3/2016 was 0.2 degrees higher compared to 3/2013. The average soil temperature was 1.1 degrees higher in 3/2016 compared to 3/2013 as well. The ETo in 3/2013 was only 4.8 inches compared to 4.92 inches in 3/2016.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

April 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

3

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2258.53 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2893.33 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

439.39

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

255.95 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

112.93 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

57.87 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

84.47 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

52

30 See Click Fix related, zero iEfficient app notices, eight SWRCB Website Reporting, 14 emails in Stop the Drop or referred by other dept.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,190

Total of 1,091 calls per call records from IT Report for ext. 4965 (Tayler – 127 in, 273 out, 400 total, ext. 3768 (Haley – 240 in, 441 out, total 681) and ext. 3692 (Monica – 10 in-voice messages, 0 out, 10 total). 49 direct contacts with customers (per automated Crossbow report from IT), 23 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 5 tier 5 calls (included in the total calls), 27 tier 5 emails and no tier 5 site visits/audits.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

19

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1517

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In April 2016, a total of 838 customers had water usage charged in Tier 3 (inefficient use), 329 customers had water usage charged in Tier 4 (Excessive Water Use) and 350 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In April 2016, Corona's Water Resources Team received 513 calls relating to water conservation questions, rebate programs and water waste with 768 outgoing calls. A total of 131 residential landscape checkup (water audits) appointments, 8 commercial/industrial mixed meter audits, one multi-family residential audits (mixed use meter accounts) and 71 follow up site visits was completed, that included; sprinkler and timer adjustments, leak repairs, follow up calls and door hangers. The installation of water saving devices at nine properties was completed. 34 sites were investigated for water waste by Water Resources Technician in April 2016. During the month there were six education events held and seven classroom presentations reaching 215 students. 80 bathroom aerators, 37 hose nozzles, 28 kitchen aerators, 57 showerheads, 54 toilet dye tablets, 67 shower timers, 24 buckets and 200 car washing sponges were delivered or provided to residential customers. 150 rebates were issued for residential customers and 2,909 commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Overall water sales (direct customer consumption) decreased by 20% in April 2016 compared to 2013. Residential usage decreased by 19% and CII usage decreased by 23%. The current accumulated reduction in water sales (customer consumption) from June 2015 through April 2016 is 19%.

UC Riverside CIMIS Station 44 data showed the total ETo for 4/2016 was 6.03 compared to 5.71 in 4/2013. The average temperature in 4/2016 was 1.7 degrees higher compared to 4/2013. The average relative humidity was also 3% less in 4/2016 compared to 4/2013, creating drier conditions.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

May 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

3

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2536.276 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3314.31 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

586.60

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

397.08 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

126.81 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

64.91 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

102.97 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

51

22 See Click Fix related, zero iEfficient app notices, 11 SWRCB Website Reporting, 18 emails (13 through Water Resources Supervisor, 5 through in Stop the Drop or referred by other dept).

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

831

Total of 765 calls per call records from IT Report for ext. 4965 (Tayler – 160 in, 318 out, 478 total, ext. 3768 (Haley – 78 in, 107 out, total 185) and ext. 3692 (Monica – 45 in-voice messages, 57 out, 102 total). 50 direct contacts with customers (per automated Crossbow report from IT), 5 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 39 tier 5 calls (included in the total calls), 2 tier 5 emails and 9 tier 5 site visits/audits.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

11

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1790

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In May 2016, a total 1,061 customers had water usage charged in Tier 3 (inefficient use), 802 customers had water usage charged in Tier 4 (Excessive Water Use) and 394 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In May 2016, Corona's Water Resources Team received 283 calls relating to water conservation questions, rebate programs and water waste with 560 outgoing calls. A total of 111 residential landscape checkup (water audits) appointments, two commercial/industrial mixed meter audits, one multi-family residential audits (mixed use meter accounts) and 35 follow up site visit was completed, that included; sprinkler and timer adjustments, leak repairs, follow up calls and door hangers. The installation of water saving devices at four properties was completed. 28 sites were investigated for water waste by Water Resources Technician in May 2016. During the month there was one education event held and 11 classroom presentations reaching 323 students. 52 bathroom aerators, 23 hose nozzles, 21 kitchen aerators, 39 showerheads, 34 toilet dye tablets, 38 shower timers, and 19 buckets were delivered or provided to residential customers. 84 rebates were issued for residential customers and 584 commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

The quantities of commercial, industrial, and institutional (CII) water was updated for the month of May. The percentage residential use (PRU) and residential gallons-per-capita-day (R-GPCD) was also updated to reflect the CII changes made.

The current accumulated reduction in water sales (customer consumption) from June 2015 through May 2016 is 18%.

UC Riverside CIMIS Station 44 data showed the total precipitation for 5/2016 was 0.23 inches less compared to 5/2013.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

June 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2939.22 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3550.04 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

553.10

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

393.14 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

146.96 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

54.63 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

103.78 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

67

41 See Click Fix related, three iEfficient app notices, two SWRCB Website Reporting, 21 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

139

21 direct contacts with customers (per automated Crossbow report from IT), 111 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), 6 tier 5 emails and one tier 5 site visits/audits.

Total of 963 calls per call records from IT Report for ext. 4965 (Tayler – 183 in, 179 out, 362 total), ext. 3768 (Haley – 239 in, 284 out, total 523) and ext. 3692 (Monica – 41 in-voice messages, 37 out, 78 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

11

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2141

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In June 2016, a total 1,221 customers had water usage charged in Tier 3 (inefficient use), 483 customers had water usage charged in Tier 4 (Excessive Water Use) and 437 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

In June 2016, Corona's Water Resources Team received 463 calls relating to water conservation questions, rebate programs and water waste with 500 outgoing calls. A total of 109 residential landscape checkup (water audits) appointments, six commercial/industrial mixed meter audits, zero multi-family residential audits (mixed use meter accounts) and 21 follow up site visit was completed, that included; sprinkler and timer adjustments, leak repairs, follow up calls and door hangers. The installation of water saving devices at seven properties was completed. 44 sites were investigated for water waste by Water Resources Technician in June 2016. During the month there was two education events held. 36 bathroom aerators, 22 hose nozzles, 13 kitchen aerators, 6 showerheads, 29 toilet dye tablets, 29 shower timers, and 13 buckets were delivered or provided to residential customers. 245 rebates were issued for residential customers and no commercial rebates were issued.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the average air temperature was 3.2 degrees higher in June 2016 compared to June 2013. The average relative humidity was 6% less in June 2016 compared to June 2013. These factors created a hotter and drier condition in Corona in June 2016 in comparison to June of 2013.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

July 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3303.31 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3794.64 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

722.70

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

471.06 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

165.17 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

62.38 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

128.88 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

17

3 See Click Fix related, zero iEfficient app notices, zero SWRCB Website Reporting, 14 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

72

10 direct contacts with customers (per automated Crossbow report from IT), 53 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), 8 tier 5 emails and one tier 5 site visits/audits.

Total of 725 calls per call records from IT Report for ext. 4965 (Tayler – 145 in, 124 out, 269 total), ext. 3768 (Haley – 184 in, 272 out, total 456) and ext. 3692 (Monica – 0 in-voice messages, 0 out, 0 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2572

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In July 2016, a total 1560 customers had water usage charged in Tier 3 (inefficient use), 531 customers had water usage charged in Tier 4 (Excessive Water Use) and 481 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

August 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3328.664 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3819.25 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

852.57

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

539.13 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

166.43 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

68.57 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

142.76 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

26

8 See Click Fix related, zero iEfficient app notices, zero SWRCB Website Reporting, 18 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

89

49 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), 8 tier 5 emails and 11 tier 5 site visits/audits.

Total of 931 calls per call records from IT Report for ext. 4965 (Tayler – 159 in, 212 out, 371 total), ext. 3768 (Haley – 266 in, 294 out, total 560) and ext. 3692 (Monica – 0 in-voice messages, 0 out, 0 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3204

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In August 2016, a total of 1,871 customers had water usage charged in Tier 3 (Inefficient Use), 703 customers had water usage charged in Tier 4 (Excessive Water Use) and 630 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average air temperature was 0.7 degrees higher in August 2016 compared to August 2013. The average soil temperature was 2.7 degrees higher in August 2016 compared to August 2013. In addition, there was no precipitation in August 2016 while there was 1.2 inches in August of 2013. These factors created a hotter and drier condition in Corona in August 2016 in comparison to August of 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

September 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2981.24 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3586.07 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

821.04

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

461.74 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

149.06 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

70.49 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

135.82 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

30

20 See Click Fix related, zero iEfficient app notices, one SWRCB Website Reporting, nine emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,121

22 direct contacts with customers (per automated Crossbow report from IT), 28 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), 8 tier 5 emails and 6 tier 5 site visits/audits.

Total of 1,057 calls per call records from IT Report for ext. 4965 (Tayler – 171 in, 331 out, 502 total), ext. 3768 (Haley – 269 in, 286 out, total 555) and ext. 3692 (Monica – 0 in-voice messages, 0 out, 0 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

9

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4336

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In September 2016, a total 2,384 customers had water usage charged in Tier 3 (inefficient use), 1,022 customers had water usage charged in Tier 4 (Excessive Water Use) and 930 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into Tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

October 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2650.29 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3070.90 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

790.68

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

448.48 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

132.51 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

78.13 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

129.50 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

16

Five See Click Fix related, zero iEfficient app notices, zero SWRCB Website Reporting, 11 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

814

18 direct contacts with customers (per automated Crossbow report from IT), 43 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), eight tier 5 emails and 22 tier 5 site visits/audits.

Total of 723 calls per call records from IT Report for ext. 4965 (Tayler – 92 in, 192 out, 284 total), ext. 3768 (Haley – 197 in, 242 out, total 439) and ext. 3692 (Monica – 0 in-voice messages, 0 out, 0 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

9

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4459

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In October 2016, a total 2,842 customers had water usage charged in Tier 3 (inefficient use), 403 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,214 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average air temperature was 3.8 degrees higher in October 2016 compared to October 2013. The average soil temperature was 3.6 degrees higher in October 2016 compared to October 2013. These factors created a hotter and drier condition in Corona in October 2016 in comparison to October of 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

November 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2256.05 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2457.59 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

614.95

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

328.89 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

112.8 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.16 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

105.20 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

10

Three See Click Fix related, zero iEfficient app notices, two SWRCB Website Reporting, 5 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

737

16 direct contacts with customers (per automated Crossbow report from IT), 24 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), nine tier 5 emails and 16 tier 5 site visits/audits.

Total of 672 calls per call records from IT Report for ext. 4965 (Tayler – 119 in, 152 out, 271 total), ext. 3768 (Haley – 108 in, 153 out, total 261) and ext. 3692 (Monica – 45 in-voice messages, 95 out, 140 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

3

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3049

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In November 2016, a total of 3,049 customers had water usage charged in Tier 3 (Inefficient Use), 1,425 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,419 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature was 4.1 degrees higher in November 2016 compared to November 2013. The average soil temperature was 1.9 degrees higher in November 2016 compared to November 2013. The average maximum relative humidity was 5 percent lower in November 2016 compared to November 2013. The total precipitation was 0.14 inches lower in November 2016 compared to November 2013. These factors created a hotter and drier condition in Corona in November 2016 in comparison to November of 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

December 2016

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1768.8 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2194.43 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

556.25

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

328.89 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

88.44 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

84.18 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

93.13 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

12

Two See Click Fix related, zero iEfficient app notices, two SWRCB Website Reporting, eight emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

637

22 direct contacts with customers (per automated Crossbow report from IT), 12 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), eight tier 5 emails and 17 tier 5 site visits/audits.

Total of 578 calls per call records from IT Report for ext. 4965 (Tayler – 98 in, 115 out, 213 total), ext. 3768 (Haley – 152 in, 186 out, total 338) and ext. 3692 (Monica – 10 in-voice messages, 17 out, 27 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

16

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5576

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In December 2016, a total 2,647 customers had water usage charged in Tier 3 (Inefficient Use), 1,311 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,618 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into Tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 1.8 degrees higher in December 2016 compared to December 2013. This factor created a hotter and drier condition in Corona in December 2016 in comparison to December of 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

January 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1362.791 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1749.15 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

393.26

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

196.37 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

68.14 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

86.77 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

73.96 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

10

Two See Click Fix related, one iEfficient app notices, zero SWRCB Website Reporting, seven emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

999

64 direct contacts with customers (per automated Crossbow report from IT), 22 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 49 tier 5 calls (included in the total calls), eight tier 5 emails and 16 tier 5 site visits/audits.

Total of 840 calls per call records from IT Report for ext. 4965 (Tayler – 137 in, 213 out, 350 total), ext. 3768 (Haley – 181 in, 185 out, total 366) and ext. 3692 (Monica – 38 in-voice messages, 86 out, 124 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

3

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

7933

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In January 2017, a total 2,266 customers had water usage charged in Tier 3 (Inefficient Use), 1,575 customers had water usage charged in Tier 4 (Excessive Water Use) and 4,092 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into Tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 3.6 degrees higher in January 2017 compared to January 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

February 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1243.55 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1650.11 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

280.30

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

153.27 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

62.18 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

75.03 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

64.61 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

8

Two See Click Fix related, one iEfficient app notices, zero SWRCB Website Reporting, seven emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

741

25 direct contacts with customers (per automated Crossbow report from IT), nine email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), 18 tier 5 emails and seven tier 5 site visits/audits.

Total of 682 calls per call records from IT Report for ext. 4965 (Tayler – 90 in, 86 out, 176 total), ext. 3768 (Haley – 154 in, 179 out, total 333) and ext. 3692 (Monica – 56 in-voice messages, 117 out, 173 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

7

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3248

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In February 2017, a total of 1,563 customers had water usage charged in Tier 3 (Inefficient use), 840 customers had water usage charged in Tier 4 (Excessive Water Use) and 845 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the average soil temperature was 4.1 degrees higher in February 2017 compared to February 2013. The average air temperature was 2.1 percent higher in February 2017 compared to February 2013. These factors created hotter condition in Corona in February 2017 in comparison to February of 2013.

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

March 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

2027.36 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2416.50 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

277.40

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

295.47 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

101.37 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

43.12 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168070 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

54.67 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

16

One See Click Fix related, one SWRCB Website Reporting, 14 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

984

62 direct contacts with customers (per automated Crossbow report from IT), 45 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and seven tier 5 calls (included in the total calls), one tier 5 email and 11 tier 5 site visits/audits.

Total of 858 calls per call records from IT Report for ext. 4965 (Tayler – 108 in, 187 out, 295 total), ext. 3768 (Haley – 167 in, 215 out, total 382) and ext. 3692 (Monica – 46 in-voice messages, 135 out, 181 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1981

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In March 2017, a total 962 customers had water usage charged in Tier 3 (Inefficient Use), 470 customers had water usage charged in Tier 4 (Excessive Water Use) and 549 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the average temperature in March 2017 was 2.6 degrees higher compared to March 2013. The average soil temperature was 1.6 degrees higher in March 2017 compared to March 2013 as well. The ETo in March 2013 was only 4.8 inches compared to 5.01 inches in March 2017. Precipitation in March 2017 was only 0.15 inches compared to 0.66 in March 2013. The humidity in March 2017 was 69%, 7% less than in March 2013.

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **April 2017** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2600.844** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **2893.33** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **505.00** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

316.72 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

130.04 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

55.01 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

92.23 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

19

One See Click Fix related, three SWRCB Website Reporting, 15 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,150

111 direct contacts with customers (per automated Crossbow report from IT), 32 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 35 tier 5 calls (included in the total calls), and 39 tier 5 site visits/audits.

Total of 933 calls per call records from IT Report for ext. 4965 (Tayler – 181 in, 228 out, 409 total), ext. 3768 (Haley – 165 in, 242 out, total 407) and ext. 3692 (Monica – 41 in-voice messages, 76 out, 117 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

7

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2118

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In April 2017, a total 1134 customers had water usage charged in Tier 3 (inefficient use), 462 customers had water usage charged in Tier 4 (Excessive Water Use) and 522 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the average temperature in April 2017 was 2.7 degrees higher compared to April 2013. The average soil temperature was 1.9 degrees higher in April 2017 compared to April 2013 as well. The ETo in April 2013 was only 5.71 inches compared to 6.13 inches in April 2017.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

May 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2923.19 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3314.31 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

628.84

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

502.91 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

146.16 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

60.85 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

110.98 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

37

Six See Click Fix related, one SWRCB Website Reporting, 30 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,331

46 direct contacts with customers (per automated Crossbow report from IT), 96 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and five tier 5 site visits/audits.

Total of 1184 calls per call records from IT Report for ext. 4965 (Tayler – 169 in, 329 out, 498 total), ext. 3768 (Haley – 200 in, 330 out, total 530) and ext. 3692 (Monica – 54 in-voice messages, 102 out, 156 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

8

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1907

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In May 2017, a total 1,203 customers had water usage charged in Tier 3 (Inefficient use), 402 customers had water usage charged in Tier 4 (Excessive Water Use) and 302 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the total precipitation May 2017 was 0.19 inches less compared to May 2013. The average soil temperature was 0.3 degrees higher in May 2017 compared to May 2013 as well.

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

June 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3121.895 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3550.04 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

674.03

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

395.88 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

156.09 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

58.86 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

118.45 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

17

Six See Click Fix related, one SWRCB Website Reporting, 30 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,257

23 direct contacts with customers (per automated Crossbow report from IT), 62 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and eight tier 5 site visits/audits.

Total of 1164 calls per call records from IT Report for ext. 4965 (Tayler – 187 in, 258 out, 445 total), ext. 3768 (Haley – 185 in, 376 out, total 561) and ext. 3692 (Monica – 63 in, 95 out, 158 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

13

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2275

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In June 2017, a total 2,275 customers had water usage charged in Tier 3 (Inefficient Use), 952 customers had water usage charged in Tier 4 (Excessive Water Use) and 852 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the total precipitation June 2017 was 0 inches compared to June 2013. The average soil temperature was 2.5 degrees higher in June 2017 compared to June 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **July 2017** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **3447.24** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **3794.64** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **764.70** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

540.55 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

172.36 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

61.07 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

131.34 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

14

Six See Click Fix related, one SWRCB Website Reporting, 30 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,312

38 direct contacts with customers (per automated Crossbow report from IT), 30 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and two tier 5 site visits/audits.

Total of 1242 calls per call records from IT Report for ext. 4965 (Tayler – 148 in, 216 out, 364 total), ext. 3768 (Haley – 270 in, 503 out, total 773) and ext. 3692 (Monica – 29 in, 76 out, 105 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

1

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3684

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In July 2017, a total 2,110 customers had water usage charged in Tier 3 (Inefficient use), 831 customers had water usage charged in Tier 4 (Excessive Water Use) and 743 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average temperature in July 2017 was 4.3 degrees higher compared to July 2013. The average soil temperature was 4.0 degrees higher in July 2017 compared to July 2013 as well. Precipitation in July 2017 was only 0.03 inches compared to 0.35 in July 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list.
	Corona City of (385)
Reporting Month:	Select the month for which you are reporting
	August 2017
	NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked?
	2
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation?
	☑ **Yes**
	☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation?
	3

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month.
	3315.467 (no commas please!).
	Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.
	Enter the total potable water production **for the same month in 2013.**
	3819.25 (no commas please!).
	To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.
Units:	Select the units used in the above production figures.
	AF
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.
	916.80
	Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.
	0
	Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***
	Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.
	0
	NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

601.66 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

165.77 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.06 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

149.05 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

20

One See Click Fix related, zero SWRCB Website Reporting, 19 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,687

32 direct contacts with customers (per automated NexGen report from IT), 61 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and 24 tier 5 site emails.

Total of 1570 calls per call records from IT Report for ext. 4965 (Tayler – 200 in, 332 out, 532 total), ext. 3768 (Haley – 339 in, 477 out, total 816) and ext. 3692 (Monica – 61 in, 161 out, 222 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3515

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In August 2017, a total 2,127 customers had water usage charged in Tier 3 (Inefficient use), 794 customers had water usage charged in Tier 4 (Excessive Water Use) and 594 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average temperature in August 2017 was 1.6 degrees higher compared to August 2013. The average soil temperature was 5.4 degrees higher in August 2017 compared to August 2013 as well. Precipitation in August 2017 was only 0.39 inches compared to 1.2 in August 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

September 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

3059.74 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3586.07 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

812.10

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

515.25 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

152.99 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

68.99 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

131.69 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

21

One See Click Fix related, zero SWRCB Website Reporting, 20 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,040

14 direct contacts with customers (per automated NexGen report from IT), 14 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and 32 tier 5 site emails.

Total of 980 calls per call records from IT Report for ext. 4965 (Tayler – 232 in, 303 out, 535 total), ext. 3768 (Haley – 72 in, 38 out, total 110) and ext. 3692 (Monica – 130 in, 205 out, 335 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5504

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In September 2017, a total of 2,967 customers had water usage charged in Tier 3 (Inefficient use), 1,450 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,087 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 2.4 degrees higher in September 2017 compared to September 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **October 2017** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2987.59** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **3070.90** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **829.72** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

495.41 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

149.38 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.88 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

135.83 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

23

Three See Click Fix related, zero SWRCB Website Reporting, 20 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,362

158 direct contacts with customers (per automated NexGen report from IT), 50 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and zero tier 5 site emails.

Total of 1,154 calls per call records from IT Report for ext. 4965 (Tayler – 263 in, 419 out, 682 total), and ext. 3692 (Monica – 168 in, 304 out, 472 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

7222

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In October 2017, a total 3,047 customers had water usage charged in Tier 3 (Inefficient Use), 2,198 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,977 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the total ETo in October 2013 was 0.27 lower than in October 2017. The average temperature in October 2017 was 7.7 degrees higher compared to October 2013. The average soil temperature was 4.6 degrees higher in October 2017 compared to October 2013 as well. Precipitation in October 2017 was 0 inches compared to 0.51 in October 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

November 2017

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2439.515 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2457.59 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

685.70

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

404.46 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

121.98 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

76.29 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

119.98 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

16

Two See Click Fix related, zero SWRCB Website Reporting, 14 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,055

158 direct contacts with customers (per automated NexGen report from IT), 55 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and zero tier 5 site emails.

Total of 842 calls per call records from IT Report for ext. 4965 (Tayler – 264 in, 296 out, 560 total), and ext. 3692 (Monica – 112 in, 170 out, 282 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

14

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

8022

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In November 2017, a total 3,873 customers had water usage charged in Tier 3 (Inefficient use), 2,165 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,984 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the maximum air temperature in November 2017 was 4.2 degrees higher compared to November 2013. The average soil temperature was 4.9 degrees higher in November 2017 compared to November 2013 as well. Precipitation in November 2017 was 0.04 inches compared to 1.2 inches in November 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **December 2017** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2431.9** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **2194.43** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **616.90** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

349.75 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

121.59 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.36 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

109.79 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

16

Two See Click Fix related, one SWRCB Website Reporting, 13 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

985

135 direct contacts with customers (per automated NexGen report from IT), 26 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and zero tier 5 site emails.

Total of 824 calls per call records from IT Report for ext. 4965 (Tayler – 247 in, 342 out, 589 total), and ext. 3692 (Monica – 92 in, 143 out, 235 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

21

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

9911

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In December 2017, a total 4,236 customers had water usage charged in Tier 3 (Inefficient use), 2,449 customers had water usage charged in Tier 4 (Excessive Water Use) and 3,226 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the maximum air temperature in December 2017 was 5.5 degrees higher compared to December 2013. The average soil temperature was 1.4 degrees higher in December 2017 compared to December 2013 as well. Precipitation in December 2017 was 0 inches compared to 0.39 in December 2013. The total Evapotranspiration in December 2017 is .29 inches higher than in December 2013. The average maximum relative humidity was 4 percent lower in December 2017 than in December 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **January 2018** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2003.725** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **1749.15** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **554.60** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:	Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month. **337.47** (No commas please! Just a number [e.g., 235.23].) *Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.*
Non-revenue Water (Optional):	Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month. **100.19** (No commas please! Just a number [e.g., 235.23].)
Percentage Residential Use (PRU):	Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month. **80.01** % (percent)
Total Population Served:	Enter the total population served for the reporting month. **168432** (No commas please! Just a number [e.g., 45236].)
Residential Gallons-per-Capita-Day (R-GPCD):	Enter your estimate of the residential gallons-per-capita-day (R-GPCD). **100.02** (No commas please! Just a number [e.g., 235.23].) *When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.*

Enforcement

Water Waste Complaints:	How many public complaints of water waste or violation of conservation rules were received during the reporting month? **1** **Zero See Click Fix related, zero SWRCB Website Reporting, and one email.**
Contact Follow-ups:	How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules? **1,074** **101 direct contacts with customers (per automated NexGen report from IT), 4 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), eight tier 5 site emails and one tier 5 site visit/audit.** **Total of 960 calls per call records from IT Report for ext. 4965 (Tayler – 258 in, 364 out, 622 total), and ext. 3692 (Monica – 204 in-voice messages, 134 out, 338 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.**
Warning Actions:	How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules? **20**
Rate Penalties Issued:	How many rate penalties were issued for using water over a certain budget? **4644** *Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.*
Other Penalities Issued:	How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)? **0**

Enforcement Actions (Optional):

In January 2018, a total 2,137 customers had water usage charged in Tier 3 (Inefficient use), 1,118 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,389 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 6.2 degrees higher in January 2018 compared to January 2013. The average maximum air temperature was 7.4 degrees higher compared to January 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

February 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2084.858 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1650.11 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

455.20

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

257.80 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

104.24 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

65.3 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

94.03 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

3

Two See Click Fix related, zero SWRCB Website Reporting, and one email.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

666

98 direct contacts with customers (per automated NexGen report), five email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), eight tier 5 emails and one tier 5 site visits/audits.

Total of 554 calls per call records from IT Report for ext. 4965 (Tayler – 139 in, 204 out, 343 total) and ext. 3692 (Monica – 95 in, 116 out, 211 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

12

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4556

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In February 2018, a total 2,137 customers had water usage charged in Tier 3 (Inefficient use), 1,091 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,328 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 4.2 degrees higher in February 2018 compared to February 2013. The average maximum air temperature was 4 degrees higher compared to February 2013. Precipitation in February 2018 was 0.3 inches compared to 0.84 in February 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

March 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1867.08 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2416.50 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

473.60

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

221.22 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

93.35 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.31 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

84.43 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

17

Two See Click Fix related, zero SWRCB Website Reporting, and 15 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

546

67 direct contacts with customers (per automated Nexgen report), seven email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and eight tier 5 calls (included in the total calls), zero tier 5 emails and eight tier 5 site visits/audits.

Total of 456 calls per call records from IT Report for ext. 4965 (Tayler – 109 in, 150 out, 259 total) and ext. 3692 (Monica – 89 in, 108 out, 197 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

9

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4106

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In March 2018, a total 2,176 customers had water usage charged in Tier 3 (Inefficient use), 880 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,050 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed average soil temperature was 0.7 degrees higher in March 2018 compared to March 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **April 2018** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2572.94** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **2893.33** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **427.20** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

261.23 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

128.65 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

51.45 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168432 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

85.35 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

5

Two See Click Fix related, zero SWRCB Website Reporting, and three emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

909

70 direct contacts with customers (per automated Crossbow report from IT), 5 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 9 tier 5 calls (included in the total calls), and 7 tier 5 site visits/audits.

Total of 818 calls per call records from IT Report for ext. 4965 (Tayler – in, out, total), and ext. 3692 (Monica – in-voice messages, out, total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

1

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2704

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In April 2018, a total 1,416 customers had water usage charged in Tier 3 (inefficient use), 550 customers had water usage charged in Tier 4 (Excessive Water Use) and 738 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average air temperature in April 2018 was 1.5 degrees higher compared to April 2013. The average soil temperature was 1.8 degrees higher in April 2018 compared to April 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

UC Riverside CIMIS Station 44 data showed the average air temperature in April 2018 was 1.5 degrees higher compared to April 2013. The average soil temperature was 1.8 degrees higher in April 2018 compared to April 2013 as well.

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

May 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

2790.57 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3314.31 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

581.50

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

386.45 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

139.53 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

61.59 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

104.17 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

41

Two See Click Fix related, zero SWRCB Website Reporting, and three emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

711

72 direct contacts with customers (per automated Crossbow report from IT), 38 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and zero tier 5 calls (included in the total calls), and six tier 5 site visits/audits.

Total of 595 calls per call records from IT Report for ext. 4965 (Tayler – 168 in, 271 out, 439 total) and ext. 3692 (Monica – 82 in, 74 out, 156 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

7

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2864

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In May 2018, a total 1,536 customers had water usage charged in Tier 3 (Inefficient Use), 617 customers had water usage charged in Tier 4 (Excessive Water Use) and 711 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 0.3 degrees higher in May 2018 compared to May 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

June 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

3049.54 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3550.04 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

684.20

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

414.73 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

152.48 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

63.74 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

121.75 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

29

One See Click Fix related, zero SWRCB Website Reporting, and 28 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

788

79 direct contacts with customers (per automated Crossbow report from IT), 28 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 65 tier 5 calls (included in the total calls), and 15 tier 5 site visits/audits.

Total of 601 calls per call records from IT Report for ext. 4965 (Tayler – 127 in, 258 out, 385 total) and ext. 3692 (Monica – 105 in, 111 out, 216 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

5

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3695

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In June 2018, a total 1,988 customers had water usage charged in Tier 3 (Inefficient use), 826 customers had water usage charged in Tier 4 (Excessive Water Use) and 881 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the total ETo was higher in June 2018 by 0.25 inches than in June 2013. The average soil temperature was 1.8 degrees higher in June 2018 compared to June 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

July 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3551.3 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3794.64 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

729.00

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

478.45 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

177.56 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

59.61 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

128.31 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

20

Four See Click Fix related, zero SWRCB Website Reporting, and 16 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

1,046

67 direct contacts with customers (per automated Crossbow report from IT), 52 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 95 tier 5 calls (included in the total calls), and 46 tier 5 site visits/audits.

Total of 786 calls per call records from IT Report for ext. 4965 (Tayler – 253 in, 363 out, 616 total) and ext. 3692 (Monica – 84 in, 86 out, 170 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

3

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3037

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In July 2018, a total 1,636 customers had water usage charged in Tier 3 (Inefficient use), 687 customers had water usage charged in Tier 4 (Excessive Water Use) and 714 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in July 2018 was 6.3 degrees higher compared to July 2013. The average soil temperature was 4.2 degrees higher in July 2018 compared to July 2013 as well. Precipitation in July 2018 was only 0.31 inches compared to 0.35 inches in July 2013. The total ETo was 0.91 inches higher in July 2018 than in July 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

August 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3547.837 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3819.25 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

864.60

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:	Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month. **592.44** (No commas please! Just a number [e.g., 235.23].) *Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.*
Non-revenue Water (Optional):	Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month. **177.39** (No commas please! Just a number [e.g., 235.23].)
Percentage Residential Use (PRU):	Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month. **66.6** % (percent)
Total Population Served:	Enter the total population served for the reporting month. **173417** (No commas please! Just a number [e.g., 45236].)
Residential Gallons-per-Capita-Day (R-GPCD):	Enter your estimate of the residential gallons-per-capita-day (R-GPCD). **143.23** (No commas please! Just a number [e.g., 235.23].) *When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.*

Enforcement

Water Waste Complaints:	How many public complaints of water waste or violation of conservation rules were received during the reporting month? **20** **Four See Click Fix related, zero SWRCB Website Reporting, and 16 emails.**
Contact Follow-ups:	How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules? **1,046** **67 direct contacts with customers (per automated Crossbow report from IT), 52 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 95 tier 5 calls (included in the total calls), and 46 tier 5 site visits/audits.** **Total of 786 calls per call records from IT Report for ext. 4965 (Tayler – 253 in, 363 out, 616 total) and ext. 3692 (Monica – 84 in, 86 out, 170 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.**
Warning Actions:	How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules? **3**
Rate Penalties Issued:	How many rate penalties were issued for using water over a certain budget? **3037** *Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.*
Other Penalities Issued:	How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)? **0**

Enforcement Actions (Optional):

In July 2018, a total 1,636 customers had water usage charged in Tier 3 (Inefficient use), 687 customers had water usage charged in Tier 4 (Excessive Water Use) and 714 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in July 2018 was 6.3 degrees higher compared to July 2013. The average soil temperature was 4.2 degrees higher in July 2018 compared to July 2013 as well. Precipitation in July 2018 was only 0.31 inches compared to 0.35 inches in July 2013. The total ETo was 0.91 inches higher in July 2018 than in July 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

September 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

3170.051 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3586.07 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

893.50

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

486.86 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

158.5 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

74.44 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

147.80 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

12

Two See Click Fix related, zero SWRCB Website Reporting, and 10 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

583

17 direct contacts with customers (per automated Crossbow report from IT), 12 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 16 tier 5 calls (included in the total calls), and 2 tier 5 site visits/audits.

Total of 536 calls per call records from IT Report for ext. 4965 (Tayler – 207 in, 308 out, 515 total) and ext. 3692 (Monica – 21 in, 0 out, 21 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

0

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5341

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In September 2018, a total 2,777 customers had water usage charged in Tier 3 (Inefficient use), 1,303 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,261 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average temperature in September 2018 was 1 degree higher compared to September 2013.

The average soil temperature was 1.9 degrees lower in September 2018 compared to September 2013.

Precipitation in September 2018 was 0 inches compared to 0 in September 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

October 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2783.995 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3070.90 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

778.20

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

439.49 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

139.2 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

74.71 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

126.07 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

7

Two See Click Fix related, zero SWRCB Website Reporting, 5 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

740

97 direct contacts with customers (per automated NexGen report from IT), 5 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 38 tier 5 calls (included in the total calls), and 1 tier 5 site emails.

Total of 599 calls per call records from IT Report for ext. 4965 (Tayler – 254 in, 336 out, 590 total), and ext. 3692 (Monica – 9 in, 0 out, 9 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5891

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In October 2018, a total 2,975 customers had water usage charged in Tier 3 (Inefficient Use), 1,459 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,457 customers had water usage charged in Tier 5 (Wasteful Water Use).

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average temperature in October 2018 was 3.6 degrees higher compared to October 2013.

The average soil temperature was 5.4 degrees higher in October 2018 compared to October 2013.

Precipitation in October 2018 was 0.96 inches compared to 0.51 in October 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **November 2018** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2455.98** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **2457.59** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **666.10** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

371.88 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

122.8 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

73.64 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

113.28 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

13

6 See Click Fix related, zero SWRCB Website Reporting, 7 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

667

83 direct contacts with customers (per automated NexGen report from IT), 7 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 25 tier 5 calls (included in the total calls), and 4 tier 5 site emails.

Total of 548 calls per call records from IT Report for ext. 4965 (Tayler – 228 in, 304 out, 532 total), and ext. 3692 (Monica – 16 in, 0 out, 16 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

5

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

6629

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In November 2018, a total 3,229 customers had water usage charged in Tier 3 (Inefficient Use), 1,640 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,760 customers had water usage charged in Tier 5 (Wasteful Water Use).

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average temperature in November 2018 was 1.3 degrees higher compared to November 2013.

The average soil temperature was 1.5 degrees higher in November 2018 compared to November 2013.

Precipitation in November 2018 was 0.84 inches compared to 1.20 in November 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

December 2018

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

1825.76 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2194.43 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

576.90

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

322.65 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

91.29 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

85.87 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

95.03 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

13

Five See Click Fix related, three SWRCB Website Reporting, five emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

564

81 direct contacts with customers (per automated NexGen report from IT), 5 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 30 tier 5 calls (included in the total calls), and 5 tier 5 site emails.

Total of 443 calls per call records from IT Report for ext. 4965 (Tayler – 186 in, 253 out, 439 total), and ext. 3692 (Monica – 4 in, 0 out, 4 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

7

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

8017

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In December 2018, a total 3,638 customers had water usage charged in Tier 3 (inefficient use), 1,957 customers had water usage charged in Tier 4 (Excessive Water Use) and 2,422 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the maximum air temperature in December 2018 was 1.2 degrees lower compared to December 2013.

The average soil temperature was 3 degrees higher in December 2018 compared to December 2013 as well.

Precipitation in December 2018 was 1.01 inches compared to 0.39 in December 2013.

The total Evapotranspiration in December 2018 is .56 inches lower than in December 2013.

The average maximum relative humidity was 26 percent higher in December 2018 than in December 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

January 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1751.676 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1749.15 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

408.10

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

225.90 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

87.58 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

71.62 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

76.05 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

2

Zero See Click Fix related, zero SWRCB Website Reporting, and two email.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

830

80 direct contacts with customers (per automated NexGen report from IT), 71 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 85 tier 5 calls (included in the total calls), eight tier 5 site emails and 64 tier 5 site visit/audit.

Total of 522 calls per call records from IT Report for ext. 4965 (Tayler – 213 in, 276 out, 489 total), and ext. 3692 (Monica – 22 in-voice messages, 11 out, 33 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

7

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4177

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In January 2019, a total 1,848 customers had water usage charged in Tier 3 (Inefficient use), 967 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,362 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 3.5 degrees higher in January 2019 compared to January 2013. The average air temperature was 2.8 degrees higher compared to January 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

February 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1238.996 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1650.11 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

353.40

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

257.80 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

61.95 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

89.85 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

74.71 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

17

Three See Click Fix related, zero SWRCB Website Reporting, and 14 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

658

71 direct contacts with customers (per automated Nexgen report), seven email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 20 tier 5 calls (included in the total calls), zero tier 5 emails and 73 tier 5 site visits/audits.

Total of 487 calls per call records from IT Report for ext. 4965 (Tayler – 129 in, 165 out, 294 total) and ext. 3692 (Monica – 81 in-voice messages, 112 out, 193 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4191

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In February 2019, a total 1,759 customers had water usage charged in Tier 3 (Inefficient use), 915 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,517 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **March 2019** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **1543.526** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **2416.50** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **267.70** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

146.34 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

77.18 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

58.26 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

173417 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

54.50 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

30

OneSee Click Fix related, zero SWRCB Website Reporting, and 29 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

390

6 direct contacts with customers (per automated Nexgen report), 16 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 10 tier 5 calls (included in the total calls), zero tier 5 emails and 3 tier 5 site visits/audits.

Total of 355 calls per call records from IT Report for ext. 4965 (Tayler – 89 in, 134 out, 223 total) and ext. 3692 (Monica – 47 in, 85 out, 132 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2513

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In March 2019, a total 1,475 customers had water usage charged in Tier 3 (Inefficient use), 567 customers had water usage charged in Tier 4 (Excessive Water Use) and 908 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

April 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

2423.38 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2893.33 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

198.48

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

233.70 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

121.17 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

45.44 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

69.20 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

28

Three See Click Fix related, zero SWRCB Website Reporting, and 25 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

359

0 direct contacts with customers (per automated Nexgen report), 10 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 7 tier 5 calls (included in the total calls), and 0 tier 5 site visits/audits.

Total of 342 calls per call records from IT Report for ext. 4965 (Tayler – 72 in, 122 out, 194 total) and ext. 3692 (Monica – 43 in, 105 out, 148 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

3

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

1644

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In April 2019, a total 723 customers had water usage charged in Tier 3 (Inefficient use), 393 customers had water usage charged in Tier 4 (Excessive Water Use) and 528 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the total ETo was 0.19 inches higher compared to 2013. The average air temperature in April 2019 was 2.8 degrees higher compared to April 2013. The average soil temperature was 1.6 degrees higher in April 2019 compared to April 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **May 2019** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **2399.23** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **3314.31** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **541.70** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

346.46 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

119.96 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

66.72 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

97.35 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

28

Three See Click Fix related, zero SWRCB Website Reporting, and 25 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

504

1 direct contacts with customers (per automated Nexgen report), 12 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 19 tier 5 calls (included in the total calls), and one tier 5 site visits/audits.

Total of 471 calls per call records from IT Report for ext. 4965 (Tayler – 97 in, 235 out, 332 total) and ext. 3692 (Monica – 35 in, 104 out, 139 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

1

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

2741

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In May 2019, a total 1,406 customers had water usage charged in Tier 3 (Inefficient use), 627 customers had water usage charged in Tier 4 (Excessive Water Use) and 708 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.
Corona City of (385)

Reporting Month: Select the month for which you are reporting
June 2019
NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?
2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?
☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?
3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.
2857.91 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**
3550.04 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.
AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.
616.80

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.
0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.
0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water: Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

396.25 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional): Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

142.9 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU): Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

60.1 % (percent)

Total Population Served: Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD): Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

107.94 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints: How many public complaints of water waste or violation of conservation rules were received during the reporting month?

34

Three See Click Fix related, zero SWRCB Website Reporting, and 31 emails.

Contact Follow-ups: How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

412

4 direct contacts with customers (per automated Nexgen report), 35 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 15 tier 5 calls (included in the total calls), and four tier 5 site visits/audits.

Total of 354 calls per call records from IT Report for ext. 4965 (Tayler – 87 in, 149 out, 236 total) and ext. 3692 (Monica – 59 in, 59 out, 118 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions: How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

10

Rate Penalties Issued: How many rate penalties were issued for using water over a certain budget?

3511

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued: How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In June 2019, a total 1,782 customers had water usage charged in Tier 3 (Inefficient use), 799 customers had water usage charged in Tier 4 (Excessive Water Use) and 930 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

July 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3288.14 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3797.06 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

729.00

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

378.54 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

164.41 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

64.38 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

128.74 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

19

Five See Click Fix related, zero SWRCB Website Reporting, and 14 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

442

47 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 19 tier 5 calls (included in the total calls), and zero tier 5 site visits/audits.

Total of 376 calls per call records from IT Report for ext. 4965 (Tayler – 104 in, 173 out, 277 total) and ext. 3692 (Monica – 51 in, 48 out, 99 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

3

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3019

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In July 2019, a total 1,642 customers had water usage charged in Tier 3 (Inefficient use), 707 customers had water usage charged in Tier 4 (Excessive Water Use) and 670 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in July 2019 was 1.7 degrees higher compared to July 2013. The average soil temperature was 0.3 degrees higher in July 2019 compared to July 2013 as well. Precipitation in July 2019 was only 0.01 inches compared to 0.35 in July 2013. The total ETo was 0.9 inches higher in July 2019 than in July 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

August 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

- ☑ **Yes**
- ☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3452.48 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3819.25 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

780.60

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

549.64 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

172.62 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

68.44 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

143.71 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

86

Three See Click Fix related, zero SWRCB Website Reporting, and 83 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

493

Zero direct contacts with customers (per automated NexGen report from IT), 83 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 16 tier 5 calls (included in the total calls), and 19 tier 5 site visits/audits.

Total of 375 calls per call records from IT Report for ext. 4965 (Tayler – 97 in, 126 out, 223 total) and ext. 3692 (Monica – 70 in, 82 out, 152 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

0

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

3466

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In August 2019, a total 1,850 customers had water usage charged in Tier 3 (Inefficient use), 845 customers had water usage charged in Tier 4 (Excessive Water Use) and 771 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in August 2019 was 1.4 degrees higher compared to August 2013.

The average soil temperature was 1.6 degrees lower in August 2019 compared to August 2013.

The total ETo (Evapotranspiration) was .31 inches higher in August 2019 compared to August 2013.

Precipitation in August 2019 was 0 inches compared to 1.2 in August 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

September 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3178.482 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3586.07 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

849.80

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

569.76 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

158.92 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.92 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

145.66 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

46

Four See Click Fix related, zero SWRCB Website Reporting, and 42 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

449

Zero direct contacts with customers (per automated NexGen report from IT), 40 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., five tier 5 calls (included in the total calls), and five tier 5 site emails.

Total of 399 calls per call records from IT Report for ext. 4965 (Tayler – 112 in, 124 out, 236 total) and ext. 3692 (Monica – 60 in, 103 out, 163 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

0

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4293

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In September 2019, a total 2,339 customers had water usage charged in Tier 3 (Inefficient use), 967 customers had water usage charged in Tier 4 (Excessive Water Use) and 987 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature in September 2019 was 2.5 degrees higher compared to September 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

October 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2978.052 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3070.90 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

783.10

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

461.48 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

148.9 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

72.26 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

130.87 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

4

Four See Click Fix related, and zero SWRCB Website Reporting.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

628

49 direct contacts with customers (per automated NexGen report from IT), 26 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., 13 tier 5 calls (included in the total calls), and 11 tier 5 site emails.

Total of 529 calls per call records from IT Report for ext. 4965 (Tayler – 185 in, 192 out, 377 total) and ext. 3692 (Monica – 67 in, 85 out, 152 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4710

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In October 2019, a total 1,975 customers had water usage charged in Tier 3 (Inefficient use), 1,388 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,347 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum temperature in October 2019 was 4.8 degrees higher compared to October 2013.

The average soil temperature was 1.2 degrees higher in October 2019 compared to October 2013.

The total ETo was 4.27 inches in October 2013 compared to 5.11 inches in October 2019.

The average maximum relative humidity was 71% in October 2013 while in October 2019 it was 61%.

Precipitation in October 2019 was 0 inches compared to 0.51 in October 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

November 2019

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

2425.32 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2457.59 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

730.30

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

351.58 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

121.27 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

83.15 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

126.73 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

40

Three See Click Fix related, and zero SWRCB Website Reporting, 37 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

581

45 direct contacts with customers (per automated NexGen report from IT), 13 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., 24 tier 5 calls (included in the total calls), and 36 tier 5 site emails.

Total of 463 calls per call records from IT Report for ext. 4965 (Tayler – 123 in, 187 out, 310 total) and ext. 3692 (Monica – 77 in, 76 out, 153 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

4

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

6336

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In November 2019, a total 3,380 customers had water usage charged in Tier 3 (Inefficient use), 1,226 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,730 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in November 2019 was 0.29 degrees higher compared to November 2013.

The average soil temperature was 0.4 degrees higher in November 2019 compared to November 2013.

Total Evapotranspiration in November 2019 was 0.29 inches higher than in November 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list.
	Corona City of (385)
Reporting Month:	Select the month for which you are reporting
	December 2019
	NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked?
	2
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation?
	☑ **Yes**
	☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation?
	3

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month.
	1593.53 (no commas please!).
	Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.
	Enter the total potable water production **for the same month in 2013.**
	2194.43 (no commas please!).
	To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.
Units:	Select the units used in the above production figures.
	AF
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.
	570.10
	Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.
	0
	Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***
	Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.
	0
	NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

323.13 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

79.68 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

100.65 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

97.54 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

25

Zero See Click Fix related, and zero SWRCB Website Reporting, 25 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

482

22 direct contacts with customers (per automated NexGen report from IT), 20 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., 23 tier 5 calls (included in the total calls), and 22 tier 5 site emails.

Total of 395 calls per call records from IT Report for ext. 4965 (Tayler – 112 in, 166 out, 278 total) and ext. 3692 (Monica – 52 in, 65 out, 117 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

1

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

7173

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In December 2019, a total 3,270 customers had water usage charged in Tier 3 (Inefficient use), 1,850 customers had water usage charged in Tier 4 (Excessive Water Use) and 2,053 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☐ Increased conservation personnel (including enforcement staff)
- ☐ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 2.6 degrees higher in December 2019 compared to December 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

January 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1919.43 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1749.15 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

345.80

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

204.29 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

95.97 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

59.4 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

69.34 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

9

Three See Click Fix related, and zero SWRCB Website Reporting, 6 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

670

145 direct contacts with customers (per automated NexGen report from IT), 74 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., 13 tier 5 calls (included in the total calls), 49 tier 5 site emails and 14 tier 5 site visits/audits.

Total of 375 calls per call records from IT Report for ext. 4965 (Tayler – 59 in, 62 out, 121 total) and ext. 3692 (Monica – 98 in-voice messages, 156 out, 254 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5200

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In January 2020, a total 2,063 customers had water usage charged in Tier 3 (Inefficient use), 1,279 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,858 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☐ Raised rates
- ☐ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☐ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 3.5 degrees higher in January 2020 compared to January 2013. The total precipitation was .51 inches lower than in January 2013. The average maximum air temperature was 2.1 degrees higher compared to January 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

February 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2083.457 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

1650.11 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

395.90

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

159.27 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

104.17 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

60.46 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

81.90 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

48

One See Click Fix related, and zero SWRCB Website Reporting, 47 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

345

53 direct contacts with customers (per automated NexGen report from IT), 18 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., 12 tier 5 calls (included in the total calls), 7 tier 5 site emails and 15 tier 5 site visits/audits.

Total of 240 calls per call records from IT Report for ext. 4965 (Tayler – 19 in, 41 out, 60 total) and ext. 3692 (Monica – 65 in-voice messages, 115 out, 180 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

9

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5042

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In February 2020, a total 2,189 customers had water usage charged in Tier 3 (Inefficient use), 1,240 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,613 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☐ Reduced allocations (for allocation-based rated)
- ☐ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 1.5 degrees higher in February 2020 compared to February 2013. The total precipitation was 0.75 inches lower than in February 2013. The average maximum air temperature was 4.5 degrees higher compared to February 2013. The Evapotranspiration is 0.53 inches higher in February 2020 then in February 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

March 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1778.69 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2416.50 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

395.90

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

196.55 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

88.93 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

80.91 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

87.52 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

68

Two See Click Fix related, and zero SWRCB Website Reporting, 66 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

387

35 direct contacts with customers (per automated NexGen report from IT), 73 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and tier 5 emails and 40 tier 5 calls (included in the total calls), and 34 tier 5 site visits/audits.

Total of 205 calls per call records from IT Report for ext. 4965 (Tayler – 9 in, 1 out, 10 total) and ext. 3692 (Monica – 72 in messages, 123 out, 195 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

2

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4109

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In March 2020, a total 1,989 customers had water usage charged in Tier 3 (Inefficient use), 917 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,203 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

April 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

1934.88 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2893.33 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

385.20

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

144.34 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

96.74 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

65.4 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

79.53 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

120

Two See Click Fix related, and zero SWRCB Website Reporting, 118 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

411

94 direct contacts with customers (per automated NexGen report from IT), 149 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 23 tier 5 calls (included in the total calls), and 10 tier 5 site visits/audits.

Total of 135 calls per call records from IT Report for ext. 4965 (Tayler – 5 in, 4 out, 9 total) and ext. 3692 (Monica – 40 in messages, 86 out, 126 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

16

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

5204

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In April 2020, a total 3,634 customers had water usage charged in Tier 3 (Inefficient use), 954 customers had water usage charged in Tier 4 (Excessive Water Use) and 616 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 0.7 degrees higher in April 2020 compared to April 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:

Select your urban water supplier from the list.

Corona City of (385)

Reporting Month:

Select the month for which you are reporting

May 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:

Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions:

Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**

☐ **No**

Outdoor Irrigation:

How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production:

Enter the total potable water production for the reporting month.

3068.03 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3314.31 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units:

Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water:

Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

422.10

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water:

Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

216.40 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

153.4 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

54.85 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

102.35 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

43

Two See Click Fix related, and zero SWRCB Website Reporting, 118 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

405

92 direct contacts with customers (per automated NexGen report from IT), 194 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 15 tier 5 calls (included in the total calls), and 15 tier 5 site visits/audits.

Total of 89 calls per call records from IT Report for ext. 4965 (Tayler – 0 in, 0 out, 0 total) and ext. 3692 (Monica – 27 in messages, 62 out, 89 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

18

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

4829

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In May 2020, a total 3,564 customers had water usage charged in Tier 3 (Inefficient use), 730 customers had water usage charged in Tier 4 (Excessive Water Use) and 535 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature was 3.9 degrees higher in ay 2020 compared to May 2013. The total precipitation was .25 inches lower than in May 2013. The average maximum air temperature was 1 degrees higher compared to May 2013. The Evapotranspiration is .24 inches higher in May 2020 then in May 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

June 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3178.79 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3550.04 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

689.40

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

406.16 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

158.94 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

71.66 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

143.15 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

73

One See Click Fix related, and zero SWRCB Website Reporting, 72 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

375

89 direct contacts with customers (per automated NexGen report from IT), 186 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 29 tier 5 site visits/audits.

Total of 71 calls per call records from IT Report for ext. 3692 (Monica – 46 in messages, 25 out, 71 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

28

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

8049

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In June 2020, a total 6,337 customers had water usage charged in Tier 3 (Inefficient use), 1,237 customers had water usage charged in Tier 4 (Excessive Water Use) and 475 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the total precipitation was lower in June 2020 by 2.98 inches than in June 2013. The average soil temperature was 1 degree higher in June 2020 compared to June 2013 as well.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

July 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3475.782 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3797.06 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

726.32

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:	Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month. **439.49** (No commas please! Just a number [e.g., 235.23].) *Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.*
Non-revenue Water (Optional):	Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month. **173.79** (No commas please! Just a number [e.g., 235.23].)
Percentage Residential Use (PRU):	Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month. **63.57** % (percent)
Total Population Served:	Enter the total population served for the reporting month. **172836** (No commas please! Just a number [e.g., 45236].)
Residential Gallons-per-Capita-Day (R-GPCD):	Enter your estimate of the residential gallons-per-capita-day (R-GPCD). **134.38** (No commas please! Just a number [e.g., 235.23].) *When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.*

Enforcement

Water Waste Complaints:	How many public complaints of water waste or violation of conservation rules were received during the reporting month? **68** **Four See Click Fix related, and zero SWRCB Website Reporting, 64 emails.**
Contact Follow-ups:	How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules? **377** **268 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 28 tier 5 site visits/audits.** **Total of 81 calls per call records from IT Report for ext. 3692 (Monica – 39 in messages, 42 out, 81 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.**
Warning Actions:	How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules? **19**
Rate Penalties Issued:	How many rate penalties were issued for using water over a certain budget? **9450** *Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.*
Other Penalities Issued:	How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)? **0**

Enforcement Actions (Optional):

In July 2020, a total 7,298 customers had water usage charged in Tier 3 (Inefficient use), 1,538 customers had water usage charged in Tier 4 (Excessive Water Use) and 614 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in July 2020 was 2.1 degrees higher compared to July 2013. The average soil temperature was 2.5 degrees higher in July 2020 compared to July 2013 as well. Precipitation in July 2020 was only 0 inches compared to 0.35 in July 2013. The total ETo was 1.04 inches higher in July 2020 than in July 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

August 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3568.62 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3819.25 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

793.30

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

492.60 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

178.43 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

66.73 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

172836 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

144.83 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

65

Five See Click Fix related, and zero SWRCB Website Reporting, 60 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

454

106 direct contacts with customers (per automated NexGen report from IT), 249 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 25 tier 5 calls (included in the total calls), and 13 tier 5 site emails.

Total of 61 calls per call records from IT Report for ext. 3692 (Monica – 33 in, 28 out, 61 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

16

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

8840

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In August 2020, a total 6,847 customers had water usage charged in Tier 3 (Inefficient use), 1,428 customers had water usage charged in Tier 4 (Excessive Water Use) and 565 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in August 2020 was 4 degrees higher compared to August 2013.

The average soil temperature was 4.5 degrees lower in August 2013 compared to August 2020.

The total ETo (Evapotranspiration) was .37 inches higher in August 2020 compared to August 2013.

Precipitation in August 2020 was 0 inches compared to 1.2 in August 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

September 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

3299.49 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

3586.07 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

848.30

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:	Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month. **493.20** (No commas please! Just a number [e.g., 235.23].) *Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.*
Non-revenue Water (Optional):	Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month. **164.97** (No commas please! Just a number [e.g., 235.23].)
Percentage Residential Use (PRU):	Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month. **74.94** % (percent)
Total Population Served:	Enter the total population served for the reporting month. **168248** (No commas please! Just a number [e.g., 45236].)
Residential Gallons-per-Capita-Day (R-GPCD):	Enter your estimate of the residential gallons-per-capita-day (R-GPCD). **159.63** (No commas please! Just a number [e.g., 235.23].) *When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.*

Enforcement

Water Waste Complaints:	How many public complaints of water waste or violation of conservation rules were received during the reporting month? **108** **Eight See Click Fix related, and zero SWRCB Website Reporting, 100 emails.**
Contact Follow-ups:	How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules? **445** **113 direct contacts with customers (per automated NexGen report from IT), 226 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 31 tier 5 calls (included in the total calls), and 21 tier 5 site emails.** **Total of 54 calls per call records from IT Report for ext. 3692 (Monica – 23 in, 31 out, 54 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.**
Warning Actions:	How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules? **5**
Rate Penalties Issued:	How many rate penalties were issued for using water over a certain budget? **10337** *Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.*
Other Penalities Issued:	How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)? **0**

Enforcement Actions (Optional):

In September 2020, a total 7,898 customers had water usage charged in Tier 3 (Inefficient use), 1,764 customers had water usage charged in Tier 4 (Excessive Water Use) and 675 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average soil temperature in September 2020 was 1.1 degrees higher compared to September 2013. The average maximum air temperature in September 2020 was 5.7 degrees higher compared to September 2013. The total Evapotranspiration in September 2020 was 0.19 inches more than in September 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier:	Select your urban water supplier from the list. **Corona City of (385)**
Reporting Month:	Select the month for which you are reporting **October 2020** NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked:	Which stage of your Water Shortage Contingency Plan have you invoked? **2**
Mandatory Restrictions:	Does this stage include mandatory restrictions on outdoor irrigation? ☑ **Yes** ☐ **No**
Outdoor Irrigation:	How many days per week is watering allowed for outside irrigation? **3**

Water Production

Total Monthly Potable Water Production:	Enter the total potable water production for the reporting month. **3120.77** (no commas please!). *Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.* Enter the total potable water production **for the same month in 2013.** **3070.90** (no commas please!). *To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.*
Units:	Select the units used in the above production figures. **AF**
Commercial, Industrial, and Institutional Water:	Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month. **771.30** *Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form.* ***Once more accurate data are available, you will need to file a revised report for the reporting month.***
Commercial Agricultural Water:	Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period. **0** *Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements.* ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*** Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**. **0** *NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.*

Recycled Water:	Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month. **425.56** (No commas please! Just a number [e.g., 235.23].) *Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.*
Non-revenue Water (Optional):	Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month. **156.04** (No commas please! Just a number [e.g., 235.23].)
Percentage Residential Use (PRU):	Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month. **71.79** % (percent)
Total Population Served:	Enter the total population served for the reporting month. **168248** (No commas please! Just a number [e.g., 45236].)
Residential Gallons-per-Capita-Day (R-GPCD):	Enter your estimate of the residential gallons-per-capita-day (R-GPCD). **139.96** (No commas please! Just a number [e.g., 235.23].) *When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.*

Enforcement

Water Waste Complaints:	How many public complaints of water waste or violation of conservation rules were received during the reporting month? **113** **One See Click Fix related, and zero SWRCB Website Reporting, 112 emails.**
Contact Follow-ups:	How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules? **497** **123 direct contacts with customers (per automated NexGen report from IT), 208 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 46 tier 5 calls (included in the total calls), and 42 tier 5 site emails.** **Total of 78 calls per call records from IT Report for ext. 3692 (Monica – 33 in, 45 out, 78 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.**
Warning Actions:	How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules? **46**
Rate Penalties Issued:	How many rate penalties were issued for using water over a certain budget? **11338** *Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.*
Other Penalities Issued:	How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)? **0**

Enforcement Actions (Optional):

In October 2020, a total 8,364 customers had water usage charged in Tier 3 (Inefficient use), 2,124 customers had water usage charged in Tier 4 (Excessive Water Use) and 850 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum temperature in October 2020 was 8.3 degrees higher compared to October 2013.

The average soil temperature was 5.6 degrees higher in October 2020 compared to October 2013.

The total ETo was 4.27 inches in October 2013 compared to 4.81 inches in October 2020.

The average maximum relative humidity was 71% in October 2013 while in October 2020 it was 68%.

Precipitation in October 2020 was 0 inches compared to 0.51 in October 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

November 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2464.03 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2457.59 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

706.40

*Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. **Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

*Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. **NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

327.52 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

123.2 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

80.42 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168248 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

127.93 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

50

Zero See Click Fix related, and zero SWRCB Website Reporting, 50 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

407

90 direct contacts with customers (per automated NexGen report from IT), 111 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 29 tier 5 calls (included in the total calls), and 23 tier 5 site emails.

Total of 154 calls per call records from IT Report for ext. 4935 (David - 0 in, 67 out, 67 total) and ext. 3692 (Monica – 21 in, 66 out, 87 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

15

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

12755

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In November 2020, a total 8,741 customers had water usage charged in Tier 3 (Inefficient use), 2,779 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,235 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature in November 2020 was 3 degrees higher compared to November 2013.

The average soil temperature was 0.7 degrees higher in November 2020 compared to November 2013.

Total Evapotranspiration in November 2020 was 0.46 inches higher than in November 2013.

Total precipitation in November 2020 was 1.19 inches less than in November 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Urban Water Supplier Reporting Tool

Urban Water Supplier: Select your urban water supplier from the list.

Corona City of (385)

Reporting Month: Select the month for which you are reporting

December 2020

NOTE: Make sure to select the correct reporting **MONTH** and **YEAR**.

Water Shortage Contingency Plan

Stage Invoked: Which stage of your Water Shortage Contingency Plan have you invoked?

2

Mandatory Restrictions: Does this stage include mandatory restrictions on outdoor irrigation?

☑ **Yes**
☐ **No**

Outdoor Irrigation: How many days per week is watering allowed for outside irrigation?

3

Water Production

Total Monthly Potable Water Production: Enter the total potable water production for the reporting month.

2391.775 (no commas please!).

Total monthly potable water production includes all residential (single, multi-family, etc.), commercial, industrial, institutional, agricultural (commercial and non-commercial), landscaping, and non-revenue (e.g., lost) water. Water that is produced but not used in your service area (e.g., water transferred or sold to another water supplier) should not be included in your total potable water production.

Enter the total potable water production **for the same month in 2013.**

2194.43 (no commas please!).

To ensure percent conservation is calculated correctly, make sure to use the same methodology for calculating the 2013 baseline month's Total Monthly Potable Water Production and the reporting month's Total Monthly Potable Water Production.

Units: Select the units used in the above production figures.

AF

Commercial, Industrial, and Institutional Water: Using the **Units** above, enter the quantity of water delivered for all commercial, industrial, and institutional users for the reporting month.

598.70

Commercial, Industrial and Institutional (CII) water includes all indoor and outdoor water used by the CII sector. This includes agricultural water and landscape water used for parks, medians, etc. NOTE: If you are on a bimonthly billing cycle or unable to accurately submit this data within the current reporting period, provide your best estimate and note the data deficiencies in the "Qualifications" field at the end of this form. ***Once more accurate data are available, you will need to file a revised report for the reporting month.***

Commercial Agricultural Water: Using the units above, enter the quantity of water used exclusively for commercial agriculture for the reporting period.

0

Commercial agricultural water will be subtracted by the State Water Board from the Total Monthly Potable Water Production value for purposes of determining compliance with conservation requirements. ***NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.***

Using the units above, enter the quantity of water used exclusively for commercial agriculture **during the same month in 2013**.

0

NOTE: Certification of commercial agricultural water use is required for you to enter a number in this field.

Recycled Water:

Using the same units above, you may optionally report the total amount of recycled water beneficially used during the reporting month.

276.12 (No commas please! Just a number [e.g., 235.23].)

Recycled water used for indirect potable reuse (e.g., groundwater or surface water recharge) should be reported as part of the Total Month Potable Water Production value above.

Non-revenue Water (Optional):

Using the same units above, you may optionally report the total amount of water for which you do not receive revenue (e.g., leakage) for the reporting month.

119.59 (No commas please! Just a number [e.g., 235.23].)

Percentage Residential Use (PRU):

Enter the percentage of the Total Monthly Potable Water Production going to **residential use only** for the reporting month.

74.15 % (percent)

Total Population Served:

Enter the total population served for the reporting month.

168248 (No commas please! Just a number [e.g., 45236].)

Residential Gallons-per-Capita-Day (R-GPCD):

Enter your estimate of the residential gallons-per-capita-day (R-GPCD).

110.80 (No commas please! Just a number [e.g., 235.23].)

When calculating R-GPCD, remove Recycled Water from Total Monthly Potable Water Production, but do not remove Non-revenue Water from Total Monthly Potable Water Production; the PRU value used in the equation automatically removes Non-revenue Water. The State Water Board uses reported data to calculate the "Calculated R-GPCD" value, which is included in the monthly statewide conservation reports.

Enforcement

Water Waste Complaints:

How many public complaints of water waste or violation of conservation rules were received during the reporting month?

25

One See Click Fix related, and zero SWRCB Website Reporting, 24 emails.

Contact Follow-ups:

How many contacts (written or verbal) were made with customers for actual or alleged water waste or for a violation of water conservation rules?

400

108 direct contacts with customers (per automated NexGen report from IT), 102 email/call follow ups from water waste notices through Stop the Drop or referred by other dept., and 32 tier 5 calls (included in the total calls).

Total of 158 calls per call records from IT Report for ext. 4935 (David - 0 in, 89 out, 89 total) and ext. 3692 (Monica – 21 in, 48 out, 69 total). This includes all calls and therefore is not added in the customers follow ups regarding water waste or violations of water conservation rules.

Warning Actions:

How many formal warning actions (e.g.: written notifications, warning letters, door hangers) were issued for water waste or for a violation of conservation rules?

18

Rate Penalties Issued:

How many rate penalties were issued for using water over a certain budget?

14467

Rate penalties are fines placed on consumers for using water over a certain allocation as part of the supplier rate structure.

Other Penalities Issued:

How many penalties were issued for violations of local ordinances and/or the Water Boards' statewide prohibitions (e.g., watering on wrong day of week, letting water runoff into sidewalk/street, watering within 48 hours of a rain event, etc.)?

0

Enforcement Actions (Optional):

In December 2020, a total 10,441 customers had water usage charged in Tier 3 (Inefficient use), 2,631 customers had water usage charged in Tier 4 (Excessive Water Use) and 1,425 customers had water usage charged in Tier 5 (Wasteful Water Use). All customers with water usage falling into tier 4 and 5 are notified by postcard to schedule an appointment to address the high water usage.

Additional Information

Actions Taken:

Which of the following actions have been implemented by the supplier **since April 1, 2015?** (Check all that apply.)

- ☑ Raised rates
- ☑ Instituted surcharges
- ☑ Reduced allocations (for allocation-based rated)
- ☑ Reduced allowed outdoor irrigation days
- ☑ Restricted allowed outdoor irrigation times
- ☑ Instituted new prohibitions on specific water uses
- ☑ Instituted stricter prohibitions on specific water uses (e.g., reduced number of hours to report leaks)
- ☐ Instituted use of behavioral modification programs (e.g., WaterSmart or DropCounter)
- ☑ Instituted use of SmartMeters for data tracking and enforcement
- ☐ Instituted rationing
- ☐ Increased penalties for water waste
- ☑ Increased leak detection and repair actions
- ☑ Increased conservation personnel (including enforcement staff)
- ☑ Increased conservation program budget (e.g., education, outreach, and rebate programs)
- ☑ Increased conservation program scope (e.g., offered audits to a broader segment of customers)

Implementation Actions (Optional):

Please include any information the State Water Board should be aware of with regard to supplier implementation of the emergency regulation. (1000 character max.)

UC Riverside CIMIS Station 44 data showed the average maximum air temperature was 0.3 degrees higher in December 2020 compared to December 2013.

Qualification:

Please include any information the State Water Board should be aware of when using these data. If you are submitting a revised report, you must indicate the change and provide a justification for the change in this field (1000 characters max.).

Appendix V

WMWD Resolution 3166

Attachment 4

RESOLUTION 3166

RESOLUTION OF THE BOARD OF DIRECTORS
OF WESTERN MUNICIPAL WATER DISTRICT
OF RIVERSIDE COUNTY DETERMINING WATER
RATES AND CHARGES FOR WATER USER AGENCIES

WHEREAS, the Metropolitan Water District of Southern California (MWD) at the April 14, 2020, Board of Directors meeting adopted water rates to be effective January 1, 2022, as follows:

Tier 1 Supply Rate	$243 per acre foot
Tier 2 Supply Rate	$285 per acre foot
System Access Rate	$389 per acre foot
Water Stewardship Rate	$ 0 per acre foot
System Power Rate	$167 per acre foot
Treatment Surcharge	$344 per acre foot
Capacity Charge	$12,200 per cfs
Readiness-to-Serve Charge	$140 million

Note: the Readiness-to-Serve Charge is allocated based on each member agency's ten-year rolling average of firm water demands. Standby Charge revenues will continue to be credited against each MWD member agency's Readiness-to-Serve Charge.

Based on the rates above, the MWD Full Service Untreated Tier 1 and Tier 2 rates are $799 and $841 per acre foot, respectively, and the MWD Full Service Treated Tier 1 and Tier 2 rates are $1,143 and $1,185 per acre foot, respectively, and;

WHEREAS, the Western Municipal Water District (Western) Board of Directors at a special Board meeting on October 9, 2002, after receiving input and comments from a majority of Western's retail agency customers, adopted a method of passing through MWD charges to user agencies, and;

WHEREAS, the Western Board of Directors at a regular Board meeting on December 3, 2014, authorized a ten-year purchase order with MWD, resulting in an Initial Base Period Demand of 117,537 acre feet for Western, and consequently a Tier 1 Annual Maximum of 105,783 acre feet beginning with calendar year 2015;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Western that, effective July 1, 2021, a charge of $24.06 per acre foot is hereby added to the cost of water charged by MWD to all of the retail agencies to whom water is made available by Western. Such charge will be used by Western in the administration of the supply and delivery of water to retail agencies;

BE IT FURTHER RESOLVED that, effective July 1, 2021, a charge of $16.26 per acre foot is hereby added to the cost of treated water delivered from the Mills Gravity Line to all retail agencies to whom water is made available by Western. Such charge will be used by Western to recover the cost of day-to-day maintenance of the Mills Gravity Line.

BE IT FURTHER RESOLVED that all water delivered from MWD to retail agencies of Western shall be in accordance with the Administrative Code and the rules, regulations and policies of MWD and Western. The charges for such water deliveries shall be as follows:

(a.) For all MWD water that is not delivered through the Mills Gravity Line.

Rates for Full Service Water Deliveries, Per Acre Foot, effective January 1, 2022:

	Tier 1	Tier 2
Untreated Water Deliveries	$799.00	$841.00
Western Administrative Charge	24.06	24.06
Total for Untreated Water Deliveries	$823.06	$865.06

	Tier 1	Tier 2
Treated Water Deliveries	$1,143.00	$1,185.00
Western Administrative Charge	24.06	24.06
Total for Treated Water Deliveries	$1,167.06	$1,209.06

(b.) For all MWD water that is delivered through the Mills Gravity Line.

Rates for Full Service Water Deliveries, Per Acre Foot, effective January 1, 2022:

	Tier 1	Tier 2
Untreated Water Deliveries	$799.00	$841.00
Western Administrative Charge	24.06	24.06
Mills Gravity Line Maint. Charge	16.26	16.26
Total for Untreated Water Deliveries	$839.32	$881.32
Treated Water Deliveries	$1,143.00	$1,185.00
Western Administrative Charge	24.06	24.06
Mills Gravity Line Maint. Charge	16.26	16.26
Total for Treated Water Deliveries	$1,183.32	$1,225.32

BE IT FURTHER RESOLVED that the maximum quantity of MWD full service water to be delivered at Tier 1 rates (Tier 1 Annual Maximum) to each retail agency for Calendar Year 2022 is:

Retail Agency	CY 2022 AF
City of Corona	21,110.0
City of Norco	1,223.0
Metropolitan Water District	3.5
Elsinore Valley MWD	21,037.1
Temescal Valley Water District	3,458.5
City of Riverside	1,912.9
Rancho California Water District	27,312.1
Eagle Valley Mutual Water Company	948.2
Western Retail	28,777.7
Total Acre Feet	105,783.0

The allocation of the Tier 1 Annual Maximum above is set at 90% of each retail agency's total MWD deliveries during Fiscal Year 2006-2007, utilizing the same method used by MWD to set Western's Tier 1 Annual Maximum.

All quantities of MWD full service water delivered to a retail agency in excess of their Tier 1 Annual Maximum listed above will be charged at the Tier 2 rate. The exception to this is (a) MWD has not assessed Western any Tier 2 charges for the year, or (b) there are agencies listed above that do not use their full Tier 1 Annual Maximum during the calendar year (unused Tier 1). In this latter case, the unused Tier 1 will be allocated to each agency that exceeded their Tier 1 Annual Maximum during the calendar year based on the proportion of their excess to the total of all agencies' excess (unused Tier 1 allocation). After the allocation of unused Tier 1, if available, any full service water delivered to a retail agency in excess of their Tier 1 Annual Maximum plus their unused Tier 1 allocation will be charged at the Tier 2 rate. This is the method used in prior years.

BE IT FURTHER RESOLVED that each retail agency will pay the MWD Capacity Charge based on the capacity used on Western's maximum summer day demand placed on the MWD system between May 1 and September 30 for the three-calendar-year period ending December 31, 2020, which was September 12, 2018. The peak demands used for Calendar Year 2021's calculations are:

Elsinore Valley Municipal Water District	70.8 cfs
City of Corona	40.6 cfs
Rancho California Water District	42.9 cfs
City of Norco	0.0 cfs
Temescal Valley Water District	5.0 cfs
City of Riverside	0.0 cfs
Eagle Valley Mutual Water Company	0.0 cfs
Metropolitan Water District	0.0 cfs
Western Retail	35.4 cfs
Total	194.7 cfs

BE IT FURTHER RESOLVED that effective January 1, 2022, Western's Capacity Charge rate shall be the MWD rate of $12,200 per cfs. Each retail agency will be billed each calendar month an amount equal to the capacity used on the peak demand day multiplied by the Western Capacity Charge rate and divided by twelve as follows:

	Monthly Amount
Elsinore Valley Municipal Water District	$ 71,980.00
City of Corona	$ 41,276.67
Rancho California Water District	$ 43,615.00
City of Norco	$ 0.00
Temescal Valley Water District	$ 5,083.33
City of Riverside	$ 0.00
Eagle Valley Mutual Water Company	$ 0.00
Metropolitan Water District	$ 0.00
Western Retail	$ 35,990.00
Total	$197,945.00

BE IT FURTHER RESOLVED that effective July 1, 2021, each agency will be billed each calendar month an amount equal to their share of the MWD net Readiness-to-Serve Charge (RTS Charge). The monthly amounts for July through December 2021 and January through June 2022 are as follows:

	Monthly Amount July – Dec 2021	Monthly Amount Jan – June 2022
City of Corona	$ 51,933.83	$ 65,113.67
City of Norco	$ 0.00	$ 0.00
Metropolitan WD	$ 19.50	$ 22.50
Elsinore Valley MWD	$ 46,183.50	$ 58,392.83
Temescal Valley WD	$ 9,802.50	$ 12,468.50
City of Riverside	$ 0.00	$ 0.00
Rancho California WD	$ 59,332.50	$ 78,337.50
Eagle Valley MWC	$ 0.00	$ 41.00
Western Retail	$ 51,769.50	$ 60,016.67
Total	$ 219,041.33	$ 274,392.67

The RTS Charge assessed to Western by MWD is allocated to each retail agency and to Western’s retail customers based on the same method MWD uses to assess it, the ten-year rolling average of firm deliveries (for calendar year 2022’s allocation, the ten fiscal years are 2010-2011 through 2019-2020). The Standby Charge placed on the County tax rolls by MWD applicable to the parcels within the boundaries of each agency’s service area (less an MWD administrative charge and estimated delinquencies) is used as an offset to each agency’s share of the RTS Charge, resulting in an Adjusted RTS Charge / Credit.

For some agencies, netting their RTS Charge with their Standby Charge revenue results in a credit instead of a charge. The sum of credits from these agencies is then allocated to the remaining agencies that have a charge. The allocation of the credits is based on the proportion of each agency's Adjusted RTS Charge to the total Adjusted RTS Charge. The result is a net RTS Charge.

BE IT FURTHER RESOLVED that effective July 1, 2021, each agency will be billed annually to fund a Mills Gravity Line Fixed Major Maintenance and Repair Reserve (Maintenance Reserve). The total amount to be funded will be allocated to each agency based on their proportion of service rights owned in the Mills Gravity Line as follows:

	Total Service Rights	Percent Ownership	10 Years Maintenance Reserve	Purchase Option	Maintenance Reserve Annual Funding
City of Corona	61.50	10.89%	$ 1,265,068		$ 126,507
Temescal Valley Water District	87.96	15.57%	$ 1,809,356		$ 180,936
City of Riverside	30.00	5.31%	$ 617,107		$ 61,711
Metropolitan Water District	17.50	3.10%	$359,979		$ 35,998
Elsinore Valley Municipal Water District	54.00	9.56%	$1,110,792	$37,027	
Western Retail	313.94	55.57%	$ 6,457,814	$(37,027)	$ 756,860
Total	564.90	100.00%	$ 11,620,116	$0	$ 1,162,012

The Maintenance Reserve was established to fund inspections of the Mills Gravity Line and to fund major maintenance and repair work necessary to keep the pipeline in good working condition. The Maintenance Reserve budget amount was established by HDR, a third-party engineering consultant, who completed a condition assessment of the Mills Gravity Line. Western plans to annually fund the Maintenance Reserve based on the next 10 years of HDR's budget, totaling $11,620,116.

BE IT FURTHER RESOLVED that invoices for rates and charges shall be issued by the 15th of the month following the month for which service was provided, and invoices which are not paid before the next billing cycle (30 days) shall be subject to interest charges. Interest will be calculated at a rate of one percent (1%) per month on all amounts that remain unpaid at each billing cycle. The minimum amount of an invoice will be twenty-five dollars ($25.00) per water connection, with the minimum amount charged even if there are no water deliveries.

BE IT FURTHER RESOLVED that this resolution will be effective upon adoption, with the effective dates of various rates and charges described herein, and shall supersede Resolution 3116 of the Board of Directors of Western.

ADOPTED this 16th day of June, 2021

BRENDA DENNSTEDT
President

June 16, 2021

I HEREBY CERTIFY that the foregoing is a full, true and correct copy of Resolution 3166 adopted by the Board of Directors of Western Municipal Water District of Riverside County at its Regular Meeting held June 16, 2021.

MIKE GARDNER
Secretary-Treasurer