CITY OF CORONA

FINAL

2010 Urban Water Management Plan

June 2011

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City of Corona
2010 Urban Water Management Plan

Contact Sheet

Date plan submitted to the Department of Water Resources: July 8, 2011

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The Water supplier is a: **Municipality**

The Water supplier is a: **Retailer**

Utility services provided by the water supplier include: **Water, Wastewater, Reclaimed Water, and Power**

Is This Agency a Bureau of Reclamation Contractor? **No**

Is This Agency a State Water Project Contractor? **No**

City of Corona

URBAN WATER MANAGEMENT PLAN

FINAL

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City of Corona

Urban Water Management Plan

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LIST OF ABBREVIATIONS

Abbreviation	Description
AB	Assembly Bill
ADD	Average Day Demand
af	Acre Feet
AFY	Acre Feet per Year
BMP	Best Management Practices
BPS	Booster Pumping Station
CCWC	Corona City Water Company
CDR	Center for Demographic Research
CIMIS	California Irrigation Management Information System
CRA	Colorado River Aqueduct
CRWQCB	California Regional Water Quality Control Board
DMMs	Demand Management Measures
DOF	Department of Finance
DPH	Department of Public Health
du/ac	Dwelling Units per Acre
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ETo	Evapotranspiration
EVMWD	Elsinore Valley Municipal Water District
FAR	Floor Area Ratio
FY	Fiscal Year
gpcd	Gallons per Capita per Day
gpm	Gallons per Minute
GWMP	Groundwater Management Plan
hcf	Hundred Cubic Feet
HGL	Hydraulic Grade Line
HOA	Home Owners' Association
ICADSP	Integrated Chino – Arlington Desalter System Project
IRP	Integrated Resource Plan
MAF	Million Acre Feet
MCL	Maximum Contaminant Level
MFR	Multi-Family Residential

LIST OF ABBREVIATIONS

Abbreviation	Description
MG	Million Gallons
mgd	Million Gallons per Day
mg/l	Milligrams per Liter
MOU	Memorandum of Understanding
MWDSC	Metropolitan Water District of Southern California
NPDES	National Pollutant Discharge Elimination System
RUWMP	Regional Urban Water Management Plan
RW	Recycled Water
RWMP	Recycled Water Master Plan
RWQCB	Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SB	Senate Bill
SCAG	Southern California Association of Governments
SDP	Seawater Desalination Project
SFR	Single Family Residential
SOI	Sphere of Influence
SWP	State Water Project
TDS	Total Dissolved Solids
ULF	Ultra Low Flush
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
WCS	Water Code Section
WMP	Water Master Plan
WMWD	Western Municipal Water District
WRF	Water Reclamation Facility
WRCC	Western Regional Climate Center
WRCOG	Western Regional Council of Governments
WSA	Water Supply Assessment
WSDM	Water Surplus AND Drought Management
WSRP	Water Shortage Response Plan
WTP	Water Treatment Plant

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Table I-2 Urban Water Management Plan checklist, organized by subject

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
PLAN PREPARATION				
4	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.	10620(d)(2)		Section 1.3, p. 1-3; Appendix B
6	Notify, at least 60 days prior to the public hearing on the plan required by Section 10642, 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. Any city or county receiving the notice may be consulted and provide comments.	10621(b)		Table 1.1
7	Provide supporting documentation that the UWMP or any amendments to, or changes in, have been adopted as described in Section 10640 et seq.	10621(c)		Appendix B
54	Provide supporting documentation that the urban water management plan has been or will be provided to any city or county within which it provides water, no later than 60 days after the submission of this urban water management plan.	10635(b)		Letters to be added to Appendix B
55	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.	10642		Public newspaper notification to be added to Appendix B
56	Provide supporting documentation that the urban water supplier made the plan available for public inspection and held a public hearing about the plan. For public agencies, the hearing notice is to be provided pursuant to Section 6066 of the Government Code. The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water. Privately-owned water suppliers shall provide an equivalent notice within its service area.	10642		Section 1.4, p. 1-3
57	Provide supporting documentation that the plan has been adopted as prepared or modified.	10642		Appendix B
58	Provide supporting documentation as to how the water supplier plans to implement its plan.	10643		Section 6.2; CWC 10643 is addressed in Section 1.4

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
59	Provide supporting documentation that, in addition to submittal to DWR, the urban water supplier has submitted this UWMP to 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. This also includes amendments or changes.	10644(a)		Appendix B
60	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the urban water supplier has or will make the plan available for public review during normal business hours	10645		Appendix B
SYSTEM DESCRIPTION				
8	Describe the water supplier service area.	10631(a)		Chapter 2, p. 2-1; figure 2.1
9	Describe the climate and other demographic factors of the service area of the supplier	10631(a)		Section 2.3 and 2.4, p.2-4 to 2-6
10	Indicate the current population of the service area	10631(a)	Provide the most recent population data possible. Use the method described in "Baseline Daily Per Capita Water Use." See Section M.	Section 2.3, p. 2-4
11	Provide population projections for 2015, 2020, 2025, and 2030, based on data from State, regional, or local service area population projections.	10631(a)	2035 and 2040 can also be provided to support consistency with Water Supply Assessments and Written Verification of Water Supply documents.	Section 2.3, p. 2-4 to 2-5
12	Describe other demographic factors affecting the supplier's water management planning.	10631(a)		Section 2.2, p. 2-1 to 2-2
SYSTEM DEMANDS				
1	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.	10608.20(e)		Section 5.1, p. 5-2 to 5-6; Section 5.2, p. 5-7 to 5-8' Tables 5.1 to 5.4

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
2	*Wholesalers:* Include an assessment of present and proposed future measures, programs, and policies to help achieve the water use reductions. *Retailers:* Conduct at least one public hearing that includes general discussion of the urban retail water supplier's implementation plan for complying with the Water Conservation Bill of 2009.	10608.36 10608.26(a)	Retailers and wholesalers have slightly different requirements	Section 1.4, p. 1-3
3	Report progress in meeting urban water use targets using the standardized form.	10608.40		Not Applicable until 2015 UWMP
25	Quantify past, current, and projected water use, identifying the uses among water use sectors, for 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, conjunctive use, and (I) agriculture.	10631(e)(1)	Consider 'past' to be 2005, present to be 2010, and projected to be 2015, 2020, 2025, and 2030. Provide numbers for each category for each of these years.	Section 5.3, p. 5-8 to 5-10; Table 5.7
33	Provide documentation that either the retail agency provided the wholesale agency with water use projections for at least 20 years, if the UWMP agency is a retail agency, OR, if a wholesale agency, it provided its urban retail customers with future planned and existing water source available to it from the wholesale agency during the required water-year types	10631(k)	Average year, single dry year, multiple dry years for 2015, 2020, 2025, and 2030.	Section 7.2
34	Include projected water use for single-family and multifamily residential housing needed for lower income households, as identified in the housing element of any city, county, or city and county in the service area of the supplier.	10631.1(a)		Section 5.5
SYSTEM SUPPLIES				
13	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, and 2030.	10631(b)	The 'existing' water sources should be for the same year as the "current population" in line 10. 2035 and 2040 can also be provided.	Section 3.1, page 3-1 to 3-3; Table 3.1
14	Indicate whether groundwater is an existing or planned source of water available to the supplier. If yes, then complete 15 through 21 of the UWMP Checklist. If no, then indicate "not applicable" in lines 15 through 21 under the UWMP location column.	10631(b)	Source classifications are: surface water, groundwater, recycled water, storm water, desalinated sea water, desalinated brackish groundwater, and other.	Section 3.5, p. 3-5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
15	Indicate whether a groundwater management plan 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.	10631(b)(1)		Section 3.5, p. 3-5; Appendix D
16	Describe the groundwater basin.	10631(b)(2)		Section 3.5, p. 3-5 to 3-10; Figure 3.2
17	Indicate whether the groundwater basin is adjudicated? Include a copy of the court order or decree.	10631(b)(2)		Section 3.5, p. 3-5
18	Describe the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. If the basin is not adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Not applicable
19	For groundwater basins that are not adjudicated, provide information as to whether DWR has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, 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 eliminate the long-term overdraft condition. If the basin is adjudicated, indicate “not applicable” in the UWMP location column.	10631(b)(2)		Section 3.4, p. 3-11 to 3-12
20	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	10631(b)(3)		Section 3.5, p. 3-9 to 3-10; Table 3.3
21	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	10631(b)(4)	Provide projections for 2015, 2020, 2025, and 2030.	Section 3.5, p. 3-10; Table 3.4
24	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	10631(d)		Table 7.17, p. 7-20
30	Include a detailed description of all water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years, excluding demand management programs addressed in (f)(1). Include specific projects, describe water supply impacts, and provide a timeline for each project.	10631(h)		Section 7.2, p. 7-3
31	Describe desalinated water project opportunities for long-term supply, including, but not limited to, ocean water, brackish water, and groundwater.	10631(i)		Section 3.6, p. 3-11; Table 3.5

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
44	Provide information on recycled water and its potential for use as a water source in the service area of the urban water supplier. Coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	10633		Section 3.7, p. 3-11; Chapter 4, p. 4-1 to 4-4
45	Describe 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.	10633(a)		Section 4.1, p. 4-1
46	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.	10633(b)		Section 4.1, p. 4-1 to 4-3; Table 4.1 to 4.3
47	Describe the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.	10633(c)		Section 4.2, p. 4-1 to 4-3; Table 4.1
48	Describe and quantify 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.	10633(d)		Section 4.3, p. 4-4; Table 4.5
49	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.	10633(e)		Section 4.4, p. 4-3 to 4-4; Table 4.4
50	Describe the 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.	10633(f)		Section 4.4, p. 4-4
51	Provide 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.	10633(g)		Section 4.4, p. 4-4
WATER SHORTAGE RELIABILITY AND WATER SHORTAGE CONTINGENCY PLANNING [b]				
5	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	10620(f)		Section 3.5, p.3-5 to 3-10
22	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage and provide data for (A) an average water year, (B) a single dry water year, and (C) multiple dry water years.	10631(c)(1)		Sections 7.4 and 7.5, p. 7-7 to 7-19

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
23	For any water source that may not be available at a consistent level of use - given specific legal, environmental, water quality, or climatic factors - describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.	10631(c)(2)		Section 7.3, p. 7-5 to 7-7; Table 7.2
35	Provide an urban water shortage contingency analysis that specifies stages of action, including up to a 50-percent water supply reduction, and an outline of specific water supply conditions at each stage	10632(a)		Section 8.1, p. 8-1 to 8-3; Table 8.1; Appendix F
36	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.	10632(b)		Section 7 (Multiple Year Supply Comparison)
37	Identify actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.	10632(c)		Section 8.5, Section 8.2, p. 8-3 to 8-6
38	Identify additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.	10632(d)		Section 8.2, p. 8-3 to 8-6
39	Specify consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.	10632(e)		Section 8.2, p. 8-3 to 8-6
40	Indicated penalties or charges for excessive use, where applicable.	10632(f)		Section 8.2, p. 8-6
41	Provide an analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.	10632(g)		Section 8.4
42	Provide a draft water shortage contingency resolution or ordinance.	10632(h)		Appendix F
43	Indicate a mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.	10632(i)		Section 8.6, p. 8-8

No.	UWMP requirement [a]	Calif. Water Code reference	Additional clarification	UWMP location
52	Provide information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments, and the manner in which water quality affects water management strategies and supply reliability	10634	For years 2010, 2015, 2020, 2025, and 2030	Section 7.7, p. 7-20 to 7-21
53	Assess the water supply reliability during normal, dry, and multiple dry 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, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. Base the assessment on the information compiled under Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.	10635(a)		Section 7.5, p. 7-11 to 7-20; Tables 7.6 to 7.16
DEMAND MANAGEMENT MEASURES				
26	Describe how each water demand management measures is being implemented or scheduled for implementation. Use the list provided.	10631(f)(1)	Discuss each DMM, even if it is not currently or planned for implementation. Provide any appropriate schedules.	Section 6.2, p. 6-8 to 6-13
27	Describe the methods the supplier uses to evaluate the effectiveness of DMMs implemented or described in the UWMP.	10631(f)(3)		Section 6.1, p. 6-2 to 6-9
28	Provide an estimate, if available, of existing conservation savings on water use within the supplier's service area, and the effect of the savings on the ability to further reduce demand.	10631(f)(4)		Section 6.1, p. 6-2 to 6-9
29	Evaluate each water demand management measure that is not currently being implemented or scheduled for implementation. The evaluation should include economic and non-economic factors, cost-benefit analysis, available funding, and the water suppliers' legal authority to implement the work.	10631(g)	See 10631(g) for additional wording.	NA
32	Include the annual reports submitted to meet the Section 6.2 requirements, if a member of the CUWCC and signer of the December 10, 2008 MOU.	10631(j)	Signers of the MOU that submit the annual reports are deemed compliant with Items 28 and 29.	Appendix G

a The UWMP Requirement descriptions are general summaries of what is provided in the legislation. Urban water suppliers should review the exact legislative wording prior to submitting its UWMP.

b The Subject classification is provided for clarification only. It is aligned with the organization presented in Part I of this guidebook. A water supplier is free to address the UWMP Requirement anywhere with its UWMP, but is urged to provide clarification to DWR to facilitate review.

2010 URBAN WATER MANAGEMENT PLAN

This executive summary provides an overview of the content included in the City of Corona's (City) 2010 Urban Water Management Plan (UWMP). The purpose of the UWMP is to 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. This report, which was prepared in compliance with the California Water Code, and as set forth in the guidelines and format established by the Department of Water Resources, constitutes the City's 2010 UWMP.

As required by the Urban Water Management Plan Act (Act), this document has been prepared with the participation of the public and in coordination with appropriate agencies. Specific coordination and participation details are included in Chapter 1.

Since the 2005 UWMP was prepared, several pieces of legislation have amended the Act. While all the applicable legislation is discussed in more detail in Chapter 1, the most notable of these is the 2009 Water Conservation Act (also known as SBx7-7) mandating a per-capita reduction in water consumption of 20 percent by the year 2020.

The City's service area is located in the northwestern portion of Riverside County and encompasses approximately 39 square miles. Small portions of the City are provided water service directly by Western Municipal Water District (WMWD) and the City also provides water service to the communities of Coronita and El Cerrito.

The City's land use is primarily residential, with smaller portions of commercial and industrial. The City is approaching build out, with about 9 percent vacant land.

As is expected from nearing build-out conditions, the City's population growth over the past 5 years has slowed significantly as compared to growth seen in the previous two decades. The City's 2010 population was just over 150,000. The City's water service area consists of about 5,000 more people in addition to the City's population. It is anticipated that the City's service area population will grow to nearly 165,000 by 2035. The population projections are shown in Table ES.1 and depicted graphically along with historical population in **Figure ES.1**.

Table ES.1 Population Projections

2010 UWMP Projected Years	2015	2020	2025	2030	2035
City Population	153,335	155,819	158,421	161,370	164,558

Notes:
Source: WRCOG Population Projections (RCCDR, 2010)

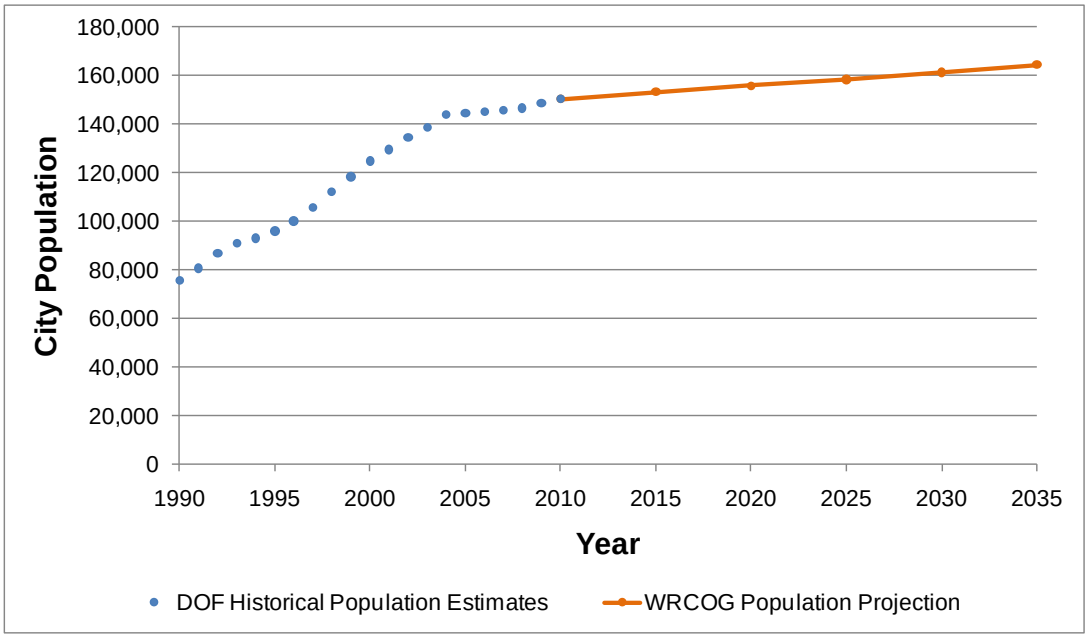


Figure ES.1 Historical and Projected Population

The City's potable or drinking water system supplies are groundwater and raw and treated imported water. A separate reclaimed water system is available for landscape irrigation and some industrial and dual plumbing uses. Over the past 5 years, just over half of the City's potable water supplies were pumped from groundwater sources. Imported water accounts for the balance of the City's potable water supplies. The City also supplies about 9 percent of its overall water from reclaimed water sources.

Figure ES.2 shows the breakdown in supplies for calendar year 2010 after incorporating reclaimed water.

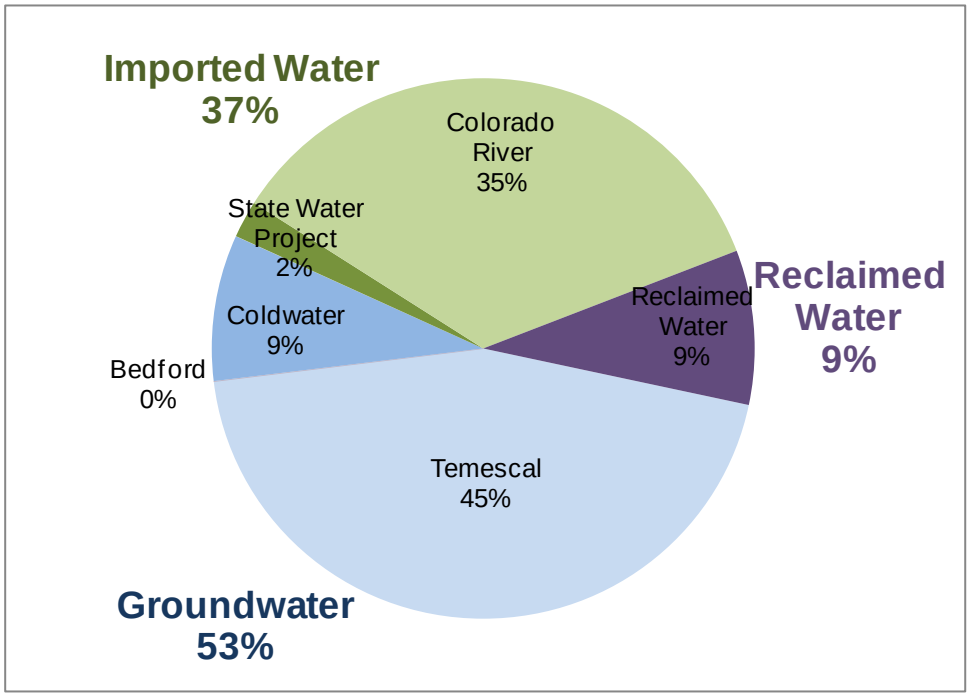


Figure ES.2 2010 Water Supply Breakdown

The City pumps groundwater from the Temescal, Bedford, and Coldwater subbasins. The City's imported water supplier is Western Municipal Water District (WMWD), a member of Metropolitan Water District of Southern California (MWDSC). MWDSC's imported water originates from the Colorado River Aqueduct and the State Water Project (SWP) and the City's geographic location allows it to obtain imported water from both of these sources.

Water demands served by the City are primarily residential, with commercial, industrial, and institutional comprising approximately 21 percent of total usage. As of 2010, the City maintains approximately 41,354 water meters serving about 30,532 acre-feet of potable water annually. As of 2010 the City also maintains 199 reclaimed water meters and delivers approximately 3,300 acre-feet of reclaimed water, with plans to expand the system. The City's potable per-capita consumption rate for the selected baseline, averaged across all account types, is about 265 gallons per day per person (gpcd). Table ES.2 presents the demand projections through planning year 2035 incorporating potable water conservation associated with the Water Conservation Act of 2009.

Table ES.2 Demand Projections

Year	Demand with Conservation (AFY)	Population[1]	Per Capita Consumption (gpcd)
2010	44,331	149,622	265
2015	40,888	153,335	238
2020	36,934	155,819	212
2025	37,551	158,421	212
2030	38,250	161,370	212
2035	39,005	164,558	212

Notes:
1. Population Projections from Table 2.2.

The Water Conservation Act of 2009 requires a per-capita reduction in water demand to a target per-capita demand based on the City's historic per-capita water demands. Details of this calculation are provided in Chapter 5. The City's baseline per-capita demand is calculated to be 265 gpcd. The interim target per-capita demand for Year 2015 is 238 gpcd, while the City's Year 2020 Target is 212 gpcd.

With reductions in per-capita water conservation (associated with the Water Conservation Act of 2009 requirement), it is anticipated that the projected water demands will decrease from 44,331 AFY in 2010 to 39,005 AFY in 2035. The projected water demand with conservation is presented along with historical demands in Figure ES.3.

As shown in Figure ES.3, the years 2008 and 2009 saw dramatic decreases in total consumption, which also significantly reduced the per-capita consumption rate, most likely due to a combination of factors such as weather, the economic downturn, and water conservation efforts by City through implementation of the new reclaimed water system. Based on discussions with City staff it was decided to use the selected baseline per-capita water use (265 gpcd), which represents demand without conservation efforts, rather than the 2009 water consumption (228 gpcd) as a basis for future demand projections, which were calculated by multiplying the projected populations by the per-capita water use. As a result of this more conservative planning assumption, the starting point of the projected demands in 2010 is much higher than the 2009 number.

Note that reclaimed water demands are not included in the demand projections shown in Figure ES.3. Reclaimed water demands will be deducted from gross water usage as potable water offsets. This will be discussed in further detail in Chapter 5.

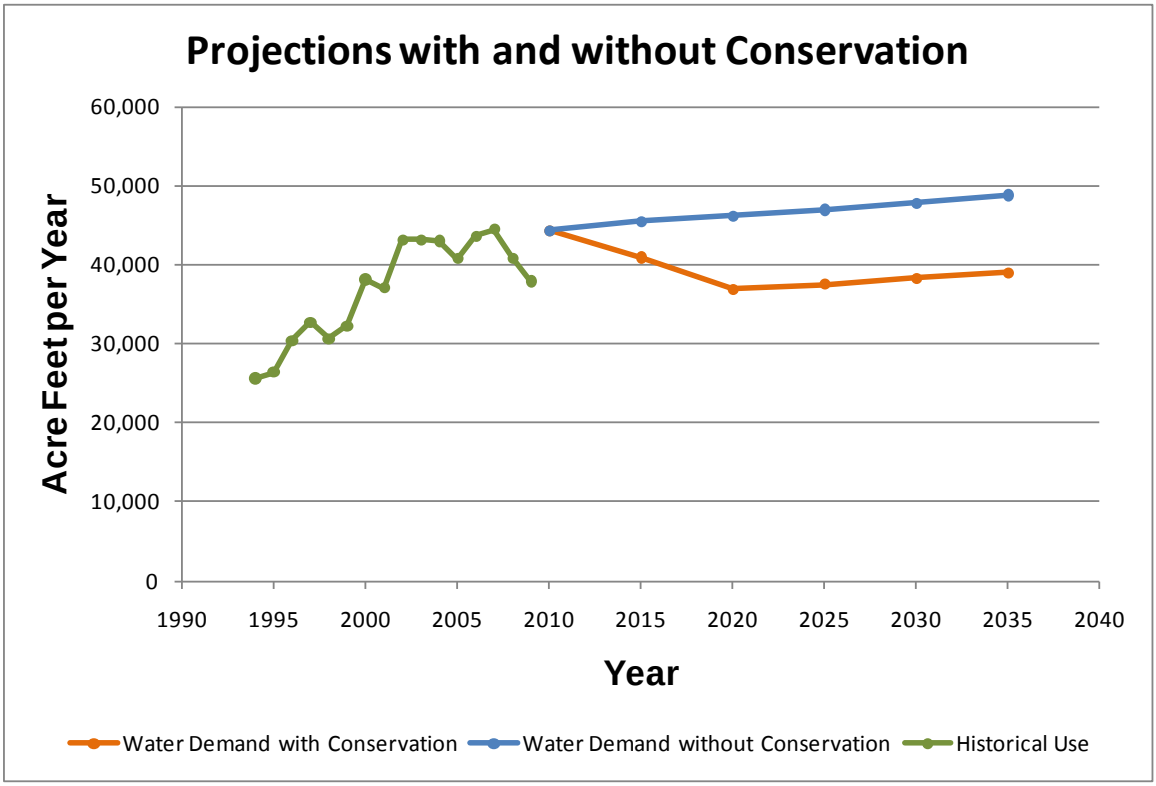


Figure ES.3 Past and Projected Water Use (with conservation)

For comparison, demand projections with and without the targets associated with the Water Conservation Act of 2009 are shown Table ES.3. Table ES.3 includes projected population based on Western Riverside Council of Governments (WRCOG) integrated growth forecast which is in turn based on the Southern California Association of Governments (SCAG) integrated growth forecast.

Table ES.3 Demand Projections with and without Water Conservation

Year	WRCOG Population[1]	Water Demand (AFY) Without Conservation	Water Demand (AFY) With Conservation
2010	149,622	44,331	44,331
2015	153,335	45,431	40,888
2020	155,819	46,167	36,934
2025	158,421	46,938	37,551
2030	161,370	47,812	38,250
2035	164,558	48,757	39,005

Notes:
1. Population Projections from Chapter 2.

As listed in Table ES.3, the water conservation requirements of the Water Conservation Act of 2009 reduce the projected water demand for year 2020 from 46,167 AFY to 36,934 AFY, a decrease of 9,233 acre-feet. Note that the offsets associated with the development of the reclaimed water system are anticipated to reduce this difference by 6,873 AFY.

As a member of the California Urban Water Conservation Council (CUWCC) and signatory of its Memorandum of Understanding (MOU), the City realizes the importance of the Best Management Practices (BMPs) to ensure a reliable future water supply. The City is committed to implementing water conservation and water reclamation programs to maximize sustainability in meeting future water needs for its customers.

Two aspects of supply reliability are considered in this UWMP. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the supply facilities. The second aspect is climate-related, and involves the availability of water during mild or severe drought periods. Chapter 7 provides a detailed look at the water supply reliability during drought periods.

Based on the supply and demand comparison presented in Chapter 7, it can be concluded that the City has sufficient supplies available to meet both potable and reclaimed water demands through 2035 under average, single dry year, and multiple dry year conditions.

To respond to potential water supply shortages, the City implemented stages, actions, and prohibitions to be invoked during declared water shortages in Ordinance 2962. This plan is an important document that explains how the City will reduce demands during periods of reduced supply. In addition, the City has also implemented several ordinances and resolutions related to promoting and implementing water conservation within its service area. For example, the City has implemented a water budget based tiered rate structure to penalize excessive usage of water. Details of the Water Shortage Response Plan (WSRP) and the related ordinances and resolutions are provided in Chapter 8.

Chapter 1

INTRODUCTION

1.1 PURPOSE

The California Water Code requires urban water suppliers within the state to prepare and adopt Urban Water Management Plans (UWMPs) for submission to the California Department of Water Resources (DWR). The UWMPs, which must be filed every 5 years, must satisfy the requirements of the Urban Water Management Planning Act (UWMPA) of 1983 including amendments that have been made to the Act. The UWMPA requires urban water suppliers servicing 3,000 or more connections, or supplying more than 3,000 acre-feet (af) of water annually, to prepare an UWMP.

The purpose of the UWMP is to 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. This report, which was prepared in compliance with the California Water Code, and as set forth in the guidelines and format established by DWR, constitutes the City of Corona's (City) 2010 UWMP.

1.2 BACKGROUND

1.2.1 Urban Water Management Planning Act

In 1983, State Assembly Bill (AB) 797 modified the California Water Code Division 6, by creating the UWMPA. Several amendments to the original UWMPA, which were introduced since 1983, have increased the data requirements and planning elements to be included in the 2005 and 2010 UWMPs.

Initial amendments to the UWMPA required that total projected water use be compared to water supply sources over the next 20 years, in 5-year increments. Recent DWR guidelines also suggest projecting through a 25-year planning horizon to maintain a 20-year timeframe until the next UWMP update has been completed and for use in developing Water Supply Assessments.

Other amendments require that UWMPs include provisions for reclaimed water use, demand management measures, and a water shortage contingency plan, set forth therein. Reclaimed water was added in the reporting requirements for water usage and figures prominently in the requirements for evaluation of alternative water supplies, when future projections predict the need for additional water supplies. Each urban water purveyor must coordinate the preparation of the water shortage contingency plan with other urban water purveyors in the area, to the extent practicable. Each water supplier must also describe their water demand management measures that are being implemented, or scheduled for implementation.

In addition to the UWMPA and its amendments, there are several other regulations that are related to the content of the UWMP. In summary, the key relevant regulations are:

- 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.
- Amendments Senate Bill (SB) 610[1], and SB 221[2], which became effective beginning January 1, 2002, require 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[3] and Water Supply Assessments[4].
- 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.
- Amendment SB 318[5] 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 105[6] requires urban water suppliers to submit their UWMPs to the California State Library.
- SBx7-7: 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.

The UWMPA is included for reference in Appendix C.

1.2.2 Previous Urban Water Management Plan

Pursuant to the UWMPA, the City previously prepared an UWMP in 2005, which was approved and adopted by the Corona City Council on November 16, 2005. Following adoption, the 2005 UWMP was submitted to DWR on December 21, 2005. The City

[1] Costa, 2001
[2] Daucher, 2001
[3] Daucher
[4] Costa
[5] Alpert, 2004
[6] Wiggins, 2004

previously prepared UWMPs in 1997 and 2000. This 2010 UWMP report serves as an update to the 2005 UWMP.

1.3 COORDINATION WITH APPROPRIATE AGENCIES

> *The UWMPA requires that the UWMP identify the water agency's coordination with appropriate nearby agencies.10620 (d) (2) 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.*

While preparing the 2010 UWMP, the City coordinated its efforts with relevant agencies to ensure that the data and issues discussed in the plan are presented accurately. Table 1.1 summarizes how the UWMP preparation was coordinated with relevant agencies in the area.

1.4 PUBLIC PARTICIPATION AND PLAN ADOPTION

The UWMPA requires that the UWMP show the water agency solicited public participation.

> *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. Prior to adopting a plan, the urban water supplier shall make the plan available for public inspection and shall hold a public hearing thereon. Prior to the hearing, notice of the time and place of hearing shall be published … After the hearing, the plan shall be adopted as prepared or as modified after the hearing.*

In accordance with the UWMPA, the City held a public hearing and adopted the 2010 UWMP on June 15, 2011. A copy of the adopting resolution and resolution of intent to adopt are included in Appendix B. The hearing provided an opportunity for the City's customers, residents, employees, and diverse socio-economic population to learn and ask questions about the current and future water supply of the City. Required information, per the UWMPA and SBx7-7, was provided at this hearing.

Two successive weeks prior to adoption; a notice of the public hearing was published in the local newspaper, notifying interested parties that the draft 2010 UWMP was available for review (Appendix B). The City will send one copy of its 2010 UWMP to the California DWR and one copy to the California State Library. These documents will be sent within 30 days of adoption. The City will send an electronic copy of its 2010 UWMP to the cities and counties within which it provides water no later than 60 days from filing with the DWR. The City will make their 2010 UWMP available for public review no later than 30 days from filing with the DWR.

Table 1.1 Coordination with Appropriate Agencies

Coordinating Agencies	Participated in Developing the Plan	Commented on the Draft	Attended Public Meetings	Was Contacted for Assistance	Was Sent a Copy of the Draft Plan	Was Sent a Notice of Intention to Adopt	Not Involved/ Not Informed
Western MWD				✓	✓	✓	
China Basin Water Master						✓	
Department of Public Health						✓	
Elsinore Valley Municipal Water District						✓	
Inland Empire Waterkeeper						✓	
Jurupa Community Services District						✓	
Lee Lake Water District						✓	
County of Orange						✓	
Orange County Water District						✓	
County of Riverside						✓	
Santa Ana Regional Water Quality Control Board						✓	
Santa Ana Watershed Project Authority						✓	
City of Norco						✓	
City of Riverside						✓	

1.5 REPORT ORGANIZATION

The UWMP contains eight chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

Executive Summary

Chapter 1 - Introduction.
This chapter presents the purpose of this UWMP, describes the efforts of the City to coordinate the preparation of the UWMP with appropriate nearby agencies, and discusses the measures used to solicit public participation in the UWMP.

Chapter 2 - Service Area.
This chapter presents a description of the City's water service area and various aspects of the area served including climate, population, and other demographic factors.

Chapter 3 – Water Sources.
This chapter presets a description of the agency's existing and future water supply sources for the next 25 years. The description of water supplies includes information on the groundwater usage such as water rights, determination if the basin is in overdraft, adjudication decree, and other relevant information.

Chapter 4 – Reclaimed Water.
This chapter includes information on the City's existing reclaimed water system and usage, as well as the projected expansion of reclaimed water use per the most recent Reclaimed Water Master Plan prepared in 2010.

Chapter 5 – Water Use.
This chapter presents the quantity of water supplied to the agency's customers including a breakdown by user classification.

Chapter 6 – Water Conservation.
This chapter is broken into two parts:

Part I includes a description of the City's Best Management Practices (BMPs) for water conservation. This includes programs which are currently implemented or scheduled for implementation.

Part II describes the City's planned efforts to meet the SBx7-7 water conservation targets.

Chapter 7 – Reliability of Supply.
In this chapter, the UWMP addresses the reliability of the agency's water supplies. This

includes supplies that are vulnerable to seasonal or climatic variations. In addition, there is an analysis of supply availability in a single dry year and in multiple dry years.

Chapter 8 – Water Shortage Contingency Plan.
This chapter includes an urban water shortage contingency analysis that includes stages of action to be undertaken in the event of water supply shortages; a water shortage contingency ordinance; prohibitions, consumption reduction methods and penalties; an analysis of revenue and expenditure impacts and measures to overcome these impacts; actions to be taken during a catastrophic interruption; and a mechanism for measuring water use reduction.

SERVICE AREA

The UWMPA requires that the UWMP include a description of the water purveyor's service area and various aspects of the area served including climate, population, and other demographic factors.

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631. (a) Describe the service area of the supplier, including current and projected population, climate, and other 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 5-year increments to 20 years or as far as data is available.*

2.1 LOCATION

The City of Corona's water service area is located in the northwestern portion of Riverside County (County) and includes the unincorporated communities of El Centro, Coronita, and parts of Temescal Canyon. The City's water service area encompasses approximately 39 square miles. As shown on Figure 2.1, 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 several Southern California highways, providing access into the City from all directions. The Riverside Freeway (SR-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.

2.2 LAND USE

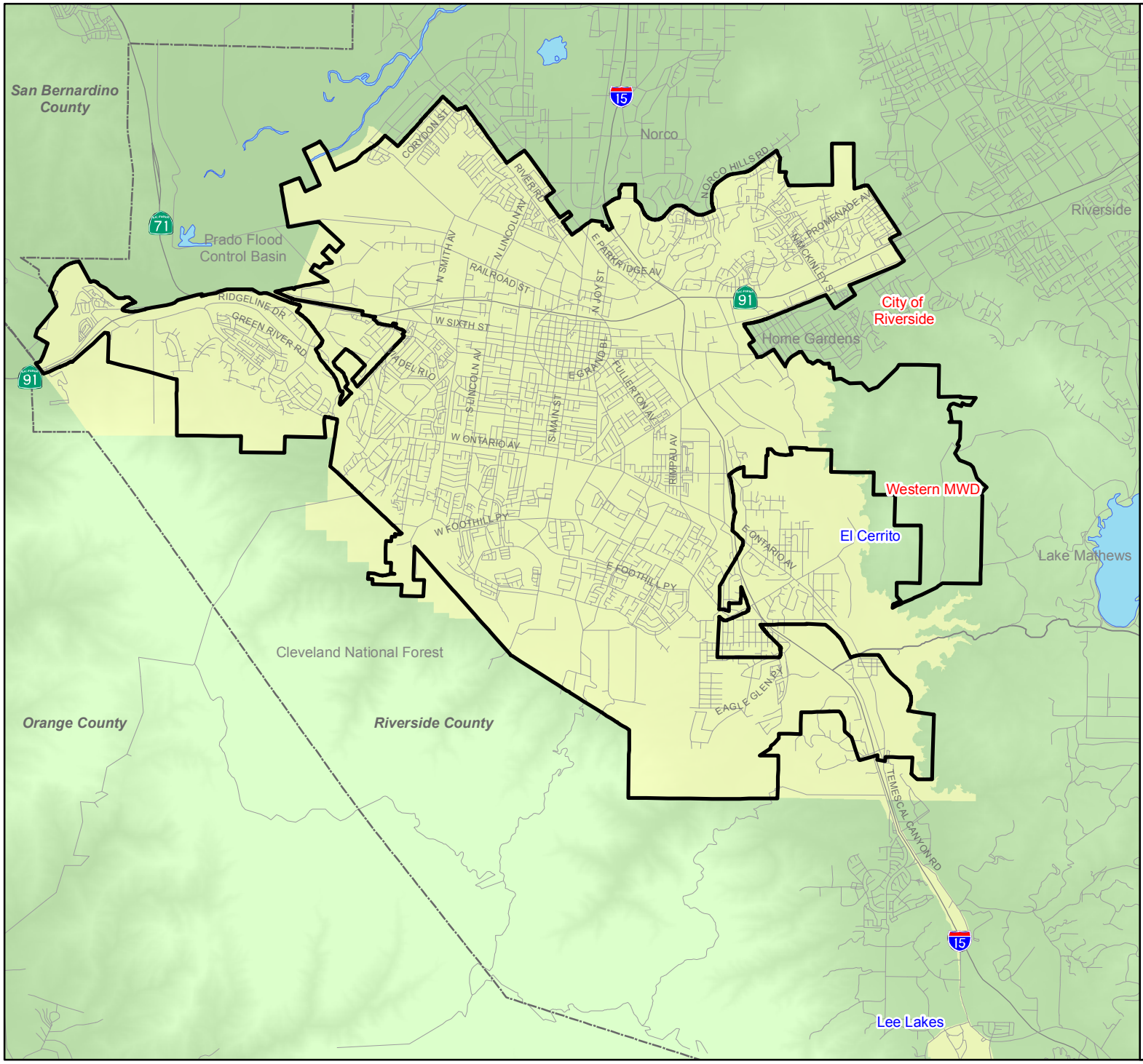
The City's land use is primarily residential, with smaller portions of commercial and industrial. The City is mostly built out, with about 9 percent vacant land. The county lands that lie within the water service area are composed primarily of residential and open space. A breakdown of the General Plan land use categories and vacant land is provided in Table 2.1.

Table 2.1 Land Use Categories

Land Use	Developed Area (acres)	Vacant Area[1] (acres)	Total Area (acres)	Percentage of Total
Residential				
Estate (ER)	1,472	459	1,931	7.7%
Low-Density Residential (LDR)	4,468	155	4,623	18.4%
Low-Medium-Density Residential (LMDR)	1,095	0	1,095	4.4%
Medium-Density-Residential (MDR)	1,168	20	1,188	4.7%
High-Density Residential (HDR)	560	71	631	2.5%
Subtotal - Residential	**8,762**	**706**	**9,468**	**37.7%**
Commercial				
Office Professional (OP)	111	3	114	0.5%
General/Community Commercial (GC)	921	19	940	3.7%
Mixed Use (MU1, MU2, MUD)	410	234	644	2.6%
Subtotal - Commercial	**1,442**	**255**	**1,697**	**6.8%**
Industrial				
Light Industry (LI)	956	191	1,147	4.6%
General Industry (GI)	1,434	77	1,511	6.0%
Subtotal - Industrial	**2,390**	**268**	**2,659**	**10.6%**
Open Space and Agricultural				
Agricultural/Rural Residential (AG)	505	0	505	2.0%
Open Space[2] (OS, OS/G, OS/R)	3,163	0	3,163	12.6%
Subtotal - Open Space and Agricultural	**3,668**	**0**	**3,668**	**14.6%**
Other				
School (S)	453	0	453	1.8%
Utility (U)	113	0	113	0.4%
Railroad (R/R, RR2)	251	453	704	2.8%
Other (FS, I, P, UDR, and blank)	390	2	392	1.6%
Subtotal - Other	**1,207**	**455**	**1,662**	**6.6%**
Not Included in General Plan GIS Layer (Streets)	**5,971**	**0**	**5,971**	**23.8%**
TOTAL	**23,441**	**1,684**	**25,125**	**100.0%**
Percentage of Total	**93%**	**7%**		

Notes:
Source: City General Plan Land Use and Vacant Land GIS layers (COC, 2010)
1. Vacant Area in each Land Use classification calculated through spatial intersection with City's Vacant Land GIS layer. Vacant land outside the City boundary was excluded.
2. While 113 acres of vacant land fell within the OS/G General Plan Land Use designation, this land was assumed to be fully developed (as non-developed open space would misrepresent the vacant land percentage calculation).

As shown in Table 2.1, residential land use accounts for about half of the City with the balance made up of about 9 percent commercial, 14 percent industrial, 20 percent open space and agricultural, and 9 percent other.



Legend

- City Boundary
- Bodies of Water
- County Boundary
- Freeway
- Major Roads
- Water Service Area
- MWD — Agencies Providing water Service within City Boundary
- Lee Lake — City Provides Water Service Outside City Boundary

0 0.5 1 2 3
Miles

Figure 2.1
Location and Service Area Map
2010 Urban Water Management Plan
City of Corona

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Note that the Open Space category in Table 2.1 includes both irrigated areas, such as parks, and non-irrigated areas, such as preserved natural open space. As shown in Table 2.1, based on the City boundary, the City's total area is 25,125 acres.

2.3 POPULATION

As is expected from nearing build-out conditions, the City's population growth over the past 5 years has slowed significantly as compared to growth seen in the previous two decades. Since the 2005 UWMP, the City's population has increased by about 5,000 people. For comparison, the City grew by about 20,000 people during the previous 5-year period (between 2000 and 2005). The City's population is currently estimated at approximately 150,416, as shown along with 20 years of historical data in Table 2.2.

While the City boundary does not coincide exactly with the City service area, analysis of census block population data shows that there is a difference of less than 5 percent between the two areas' population. Furthermore, little growth is projected to take place in the areas that overlap between the service area and City boundary. For this reason, historical City population figures as well as City population projections are used in place of service area calculations.

The City retails water to some areas outside the City boundary, including Lee Lakes, El Cerrito, and other unincorporated areas of Riverside County. Some areas within the City boundary are served by other water retailers, including the City of Riverside and the retail division of Western Municipal Water District.

Based on discussions with City staff, the population of the City's water service area is approximately 5,000 greater than the City population. The City's 1995 Water Master Plan (WMP) estimated the population served outside the City at about 10,000 people, with very little growth estimated since 1989. Based on the 2000 Census, 4,590 of this population is associated with the unincorporated community of El Cerrito. It is estimated that about 5,000 people within the City are served by other water purveyors whose service areas extend into the City boundary.

Table 2.2 Historic Population

Year	Population[1]	Year	Population[1]
1990	75,943	2000	124,966
1991	80,913	2001	129,723
1992	86,850	2002	134,694
1993	90,985	2003	138,616
1994	93,232	2004	143,947
1995	96,099	2005	144,603
1996	100,146	2006	145,295
1997	105,743	2007	145,848
1998	112,148	2008	146,620
1999	118,493	2009	148,770
		2010	150,416[2]

Notes:
Source: California Department of Finance (DOF, 2000), (DOF, 2010).
1. This data is presented graphically on Figure 2.2.
2. The estimated 2010 population based on DOF E-4 population estimates was 150,416. Based on 2010 population projections from WRCOG, the City's population would be 149,622. For consistency with population projections, the latter will be used for demand projections. Note that the City's population was estimated as 152,374 in the 2010 Census; however, for consistent implementation of SBx7-7, DWR directs agencies to use data from the 2000 census.

As shown in Table 2.2, the City's population grew from 75,943 in 1990 to 149,622 in 2010, almost doubling in size with an increase of 98 percent.

As shown in Table 2.3, the significant growth over the last two decades has decreased, with only 3,000 people anticipated to be added between 2010 and 2015 and similar growth thereafter. This reduced growth trend can be seen on Figure 2.2, which graphically depicts the population projections from Table 2.3 along with historical data from Table 2.2.

Table 2.3 Population Projections

2010 UWMP Projected Years	2015	2020	2025	2030	2035
City Population	153,335	155,819	158,421	161,370	164,558

Notes:
Source: WRCOG Population Projections (RCCDR, 2010)

Population projections are shown from 2015 to 2035. The projected population for 2035 is 164,558, which is 9 percent higher than the current 2010 service area population of 149,622. This yields an average yearly growth rate of 0.4 percent during the planning period. The UWMP uses the Western Regional Council of Governments (WRCOG) City Population Projection for further data analysis and projections. WRCOG is a sub-region

within the Southern California Association of Governments (SCAG). As such, WRCOG uses SCAG population projection data for its estimates.

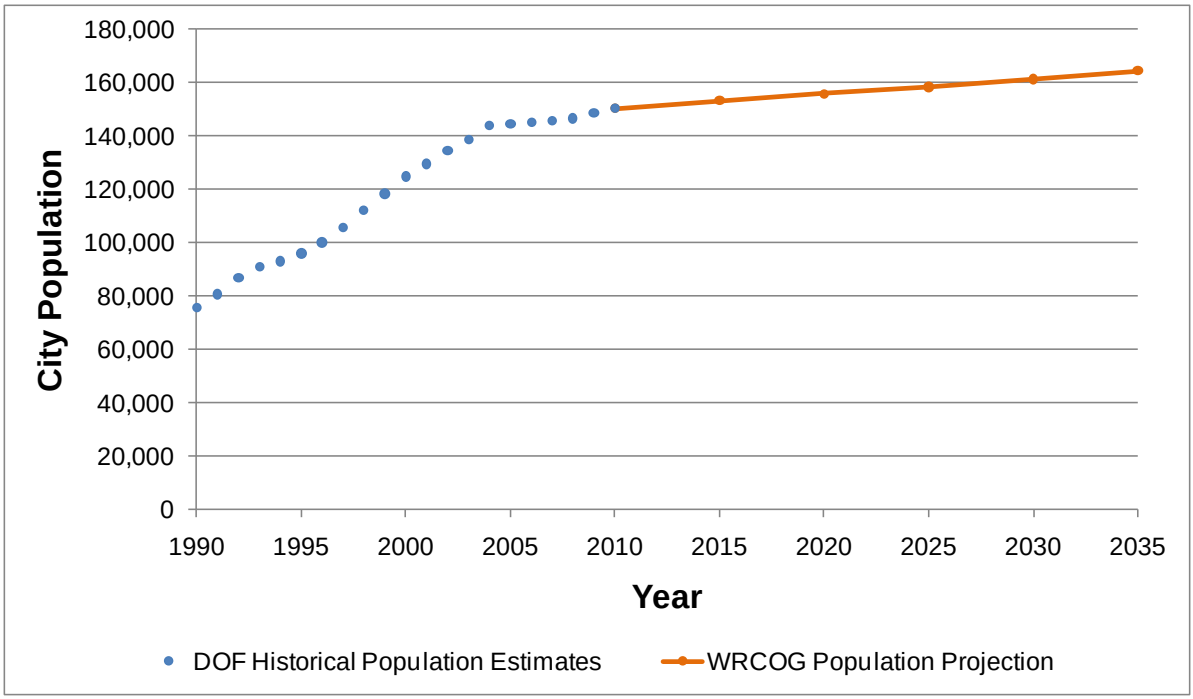

Figure 2.2 Historical and Projected Population

As shown on Figure 2.2, City population is expected to increase, but more gradually than in the past.

2.4 CLIMATE

The climate in the City is typical of Southern California with generally mild temperatures, minimal days below freezing, and approximately 330 days of sunshine per year. Table 2.4 summarizes the standard monthly average evapotranspiration (ETo) rates, rainfall, and temperature. The City's average monthly temperature ranges from 48.3 to 78.2 degrees Fahrenheit (degrees F), with an annual average temperature of 63.25 degrees F. The daily extreme low and high temperatures have been measured to be 22 degrees F and 118 degrees F, respectively. ETo averages a total of 56.37 inches per year. The average annual temperature is 63.3 degrees F.

Table 2.4 Climate Characteristics

Month	Standard Monthly Average ETo[1] (inches)	Monthly Average Rainfall[2] (inches)	Monthly Average Temperature[2] (degrees F)		
			Average	Minimum	Maximum
January	2.49	2.61	52.5	39.7	65.3
February	2.91	2.62	54. 5	41.2	67.7
March	4.16	2.00	56.7	42.8	70.5
April	5.27	0.98	60.3	45.7	74.9
May	5.94	0.26	64.6	49.9	79.3
June	6.56	0.04	69.6	53.7	85.5
July	7.22	0.02	75.0	57.7	92.3
August	6.92	0.09	75.3	58.3	92.2
September	5.35	0.25	72.4	55.6	89.1
October	4.05	0.55	65.9	50.2	81.6
November	2.94	1.14	58.9	44.3	73.5
December	2.56	2.15	53.6	40.4	66.8
Annual	**56.37**	**12.71**	**63.3**	**48.3**	**78.2**

Notes:
1. Source: California Irrigation Management Information System (CIMIS) data recorded between 1985 and 2010 (CIMIS, 2010).
2. Source: Western Regional Climate Center (WRCC) monthly average rainfall and temperature data recorded between July 1908 and July 1988 (WRCC, 1988).

As shown in Table 2.4, the historical annual average precipitation is approximately 12.71 inches. Records show that the monthly precipitation has been as high as 17 inches and as low as 0 inches. Most of the rainfall occurs during the period of November through April.

WATER SUPPLY

The UWMPA requires that the UWMP include a description of the agency's existing and future water supply sources for the next 25 years. This section includes an overview of the City's supplies along with projections of usage of each source of supply followed by a detailed discussion on each supply source. This detailed discussion includes information on imported water supplies, reclaimed water supplies, groundwater supply facilities, and the groundwater basin, such as water rights, determination of whether the basin is in overdraft, adjudication decree, and other information from the groundwater management plan (as available).

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same 5-year increments described in subdivision (a) [to 20 years or as far as data is available]. If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
>
> *10631 (b) (1) A copy of any groundwater management plan adopted by the urban water supplier…*
>
> *10631 (b) (2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For those basins for which a court or board has adjudicated the rights to pump groundwater…For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted…*
>
> *10631 (b) (3) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past 5 years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic records.*
>
> *10631 (b) (4) 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.*

3.1 SUPPLY OVERVIEW

The City's potable or drinking water system supplies are groundwater and raw and treated imported water. A separate reclaimed water system is available for landscape irrigation and some industrial and dual plumbing uses. The City pumps groundwater from the Temescal, Bedford, and Coldwater subbasins. The City's imported water supplier is Western Municipal Water District (WMWD), a member of MWDSC. MWDSC's imported water originates from the Colorado River Aqueduct (CRA) and the State Water Project (SWP).

The total supplies for the City over the previous 5 years averaged 41,528 acre-feet per year (AFY), not including reclaimed water. In 2010, 19,218 AF came from groundwater sources (excluding treatment losses) and 13,427 AF from imported water supplies (excluding wheeled supply to Norco). Figure 3.1 shows the breakdown in supplies after incorporating reclaimed water.

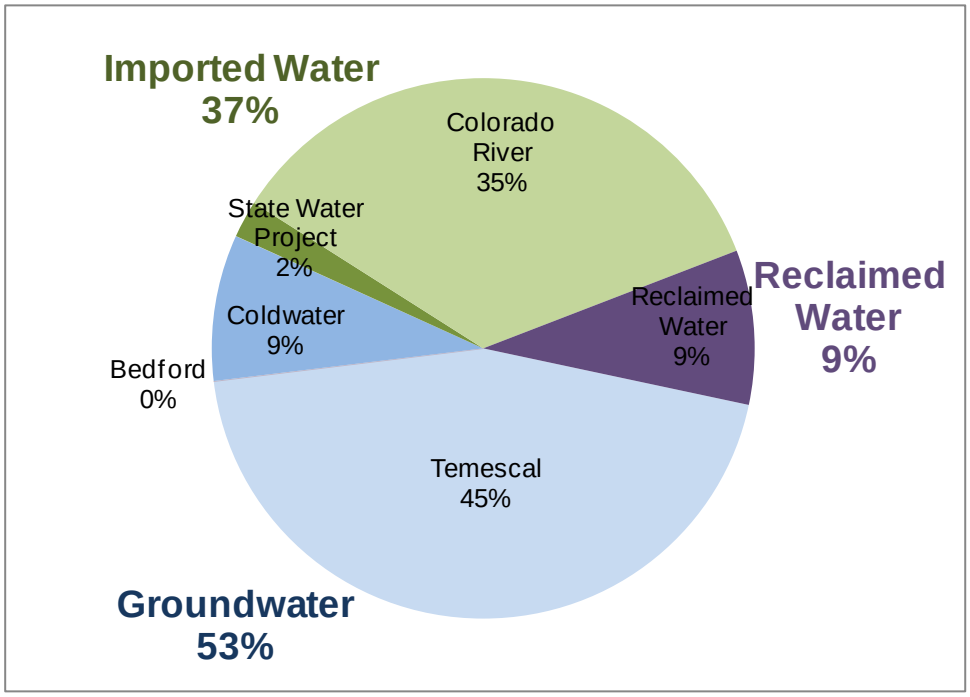

Figure 3.1 City Water Supplies for 2010

Between 1990 and 2004, the City's local groundwater supply met about 40 percent of the overall demand with the remaining 60 percent met by imported water. These numbers vary from year to year depending upon weather conditions and groundwater recharge rates[1]. Future demand projections assume an even split between groundwater and imported water, as the City has expressed this ratio as a planning goal. This will be supplemented through the use of reclaimed water as well. The anticipated sources for projected future supply are shown in Table 3.1 through the planning horizon of 2035.

[1] WMP, 2005a

Table 3.1 Current and Projected Water Supply

Supply Source	Annual Supply[1,2] (AFY)					
	2010[3]	2015	2020	2025	2030	2035
Imported Water (WMWD)	13,427	20,444	18,467	18,775	19,125	19,503
Groundwater	19,218	20,444	18,467	18,775	19,125	19,503
Total Potable	**32,645**	**40,888**	**36,934**	**37,551**	**38,250**	**39,005**
Reclaimed Water	3,308	5,222	6,873	6,873	6,873	6,873
Total	35,953	46,110	43,807	44,423	45,123	45,879

Notes:
1. Based on discussions with City staff and the 2008 GWMP, the City's supply goal is to maintain a potable supply mix of 50 percent groundwater and 50 percent imported water.
2. The projected supply is based on projected demands which incorporate required water conservation targets associated with the Water Conservation Act of 2009. This will be discussed in greater detail in Chapter 5.
3. Historical data is used for 2010. Note that, since water usage was reduced in 2010, for conservative planning purposes water demand projections are not based on 2010 usage. Demand projections will be discussed in further detail in Chapter 5.

The growth in demands associated with the supply projection is discussed in Chapter 5. As shown, groundwater and imported water demand projections remain constant relative to each other, declining in consumption in order to reach the Water Conservation Act of 2009 target for 2020 and then resuming a growth trend due to normal population growth.

3.2 DISTRIBUTION SYSTEM AND STORAGE

The City presently provides municipal water service to nearly 154,627 people through approximately 44,330 domestic service connections to a service area of approximately 39 square miles. This area includes approximately 32 square miles within the City's municipal area, and 7 square miles within the City's Sphere Of Influence (SOI) in Riverside County.

Treated imported water from MWDSC is delivered via a single imported water connection to the City's Mills Transmission Pipeline. Untreated imported water from MWDSC is delivered to the City via three imported water connections on MWDSC's Lower Feeder, the City's Lester Water Treatment Plant (WTP), Sierra del Oro WTP, and Green River WTP[2].

The City maintains 25 active groundwater wells, 7 supplying the Temescal Desalter, 18 directly supplying the potable water distribution system, and 2 that are inactive.

The City's potable water distribution system consists of 535 miles of pipeline forming six primary pressure zones that serve elevations varying from a low point at 430 feet (Zone 1) in the Green River area to a high point of 1,520 feet (Zone 6) in South Corona.

[2] IRWMP, 2008

Pressures to City customers vary from about 40 pounds per square inch (psi) to 150 psi. Water is delivered to the various pressure zones by 16 domestic water booster pump stations (BPS)[3].

The City operates 16 potable reservoirs ranging in size from 0.5 million gallons (MG) to 6 MG with a total capacity of 43.3 MG. The city operates six blending stations. These stations blend high nitrate Temescal Basin groundwater with high quality imported water and Temescal Desalter product water to lower nitrates and total dissolved solids (TDS). The blended water meets the regulatory standards of the Environmental Protection Agency (EPA) and California Department of Public Health (DPH). The City's pressure zones are interconnected between reservoirs and supply sources by major transmission mains, ranging in size from 12 inches to 36 inches in diameter, and BPS. Distribution pipelines in the City's potable water distribution system generally range in size from 2 inches to 12 inches in diameter and are used to distribute water to residential developments and industrial and commercial users.

3.3 IMPORTED WATER

10631 (k). Urban water suppliers that rely 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 5-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 indentifies 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 5-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 information requirements of subdivisions (b) and (c), including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

The City's imported water is supplied by MWDSC and purchased through WMWD, a member agency of MWDSC. The City's imported water supply consists of treated water supplied via the Mills Pipeline from MWDSC's Henry J. Mills filtration plant and untreated water via the Lower Feeder.

The Lower Feeder supplies raw imported water to the City's Lester and Sierra del Oro WTPs through metered turnouts WR-19, WR-33, and WR-29, respectively. The Mills Pipeline delivers treated imported water directly to the City through metered turnout WR-24[4]. The Green River WTP is currently inactive, but was connected to the MWD Lower Feeder via WR-29. The capacities of each of the City's imported water connections are listed in Table 3.2 on the following page.

[3] WMP, 2005a
[4] IRWMP, 2008

Table 3.2 Capacity of Imported Water Connections

Imported Water Connection	Feeder	Feeder Type	Imported Water Source	City WTP	Design Capacity[1] (mgd)	Design Capacity[1] (cfs)	Treatment or Effective Capacity (mgd)
WR-19[2]	Lower Feeder	Raw	CRA	Lester WTP	25.9	40	30.0
WR-24	Mills Pipeline	Treated	SWP		6.5	10	6.5[2]
WR-29					3.2	5	0.0[4]
WR-33[5]	Lower Feeder	Raw	CRA	SDO WTP	9.7	15	9.0
Total					**45.3**	**70**	**45.5**

Notes:
1. Design Capacities provided by City staff.
2. Connection WR-19 includes two connections, WR-19A and WR-19B, totaling 40 cfs. However, WR-Lester WTP has a firm capacity of 25 mgd and a peak capacity of 30 mgd, limiting the effective capacity of the connection.
3. City allotted capacity is 10 cfs and City of Norco allotted capacity is 9 cfs, above which an excess flow charge is applied.
4. Connection not currently used since a WTP is not in service.
5. Sierra del Oro WTP has a firm capacity of 6 mgd and a peak capacity of 9 mgd, limiting the effective capacity of the connection.

As shown in Table 3.2, the City's effective imported water capacity is 45.5 mgd, including 6.5 mgd of treated imported water capacity and 39.0 mgd of untreated imported water capacity. As noted in Table 3.2, one of the City's three treatment plants, the Green River WTP connected to WR-29, is currently inactive.

3.4 SURFACE WATER

The City treats imported water at three water treatment plants (one of which is currently inactive) and treats groundwater at the Temescal Desalter Plant; however, the City does not receive any local surface water sources.

3.5 GROUNDWATER

As discussed in the 2008 Groundwater Management Plan (GWMP) (Appendix D), the City's service area overlays the Temescal, Bedford, and Coldwater subbasins. The Temescal subbasin is a DWR-defined subbasin of the Upper Santa Ana Valley Groundwater Basin[5], bounded on the north by the Chino subbasin and the south by the Elsinore Groundwater Basin. Two additional subbasins underlie the City's service area – the Bedford and Coldwater subbasins. The GWMP mentions that the Bedford and Coldwater subbasins were historically considered a part of the Elsinore Groundwater Basin, but are not DWR-defined subbasins. Figure 3.2 shows the extents of the Temescal subbasin and the approximate locations of the Bedford and Coldwater subbasins.

The City's groundwater supplies are pumped from the Temescal, Bedford, and Coldwater subbasins. The City has 25 groundwater wells consisting of 20 wells in the Temescal subbasin (7 of which feed the Temescal Desalter) and 5 wells in the Coldwater subbasin, (2 of which are inactive[6]).

In the past decade the City has strived to increase the production of local water relative to imported water. In 2000, water from the all of the basins composed 33 percent of total production. Since 2006, this percentage has varied between 53 and 62 percent. As noted in the 2008 GWMP, "Looking forward, Corona would like to maintain an approximate 50 percent groundwater allocation for their water supply by year 2020"[7].

The three subbasins from which the City extracts groundwater are not adjudicated, as defined by DWR. Therefore, there are no defined legal pumping rights for the City. While there is no formal legal adjudication of the basins, a memorandum of agreement concerning water production from the Coldwater subbasin went into effect December 1, 2008

[5] DWR, 2003
[6] GMP, 2008
[7] GMP, 2008

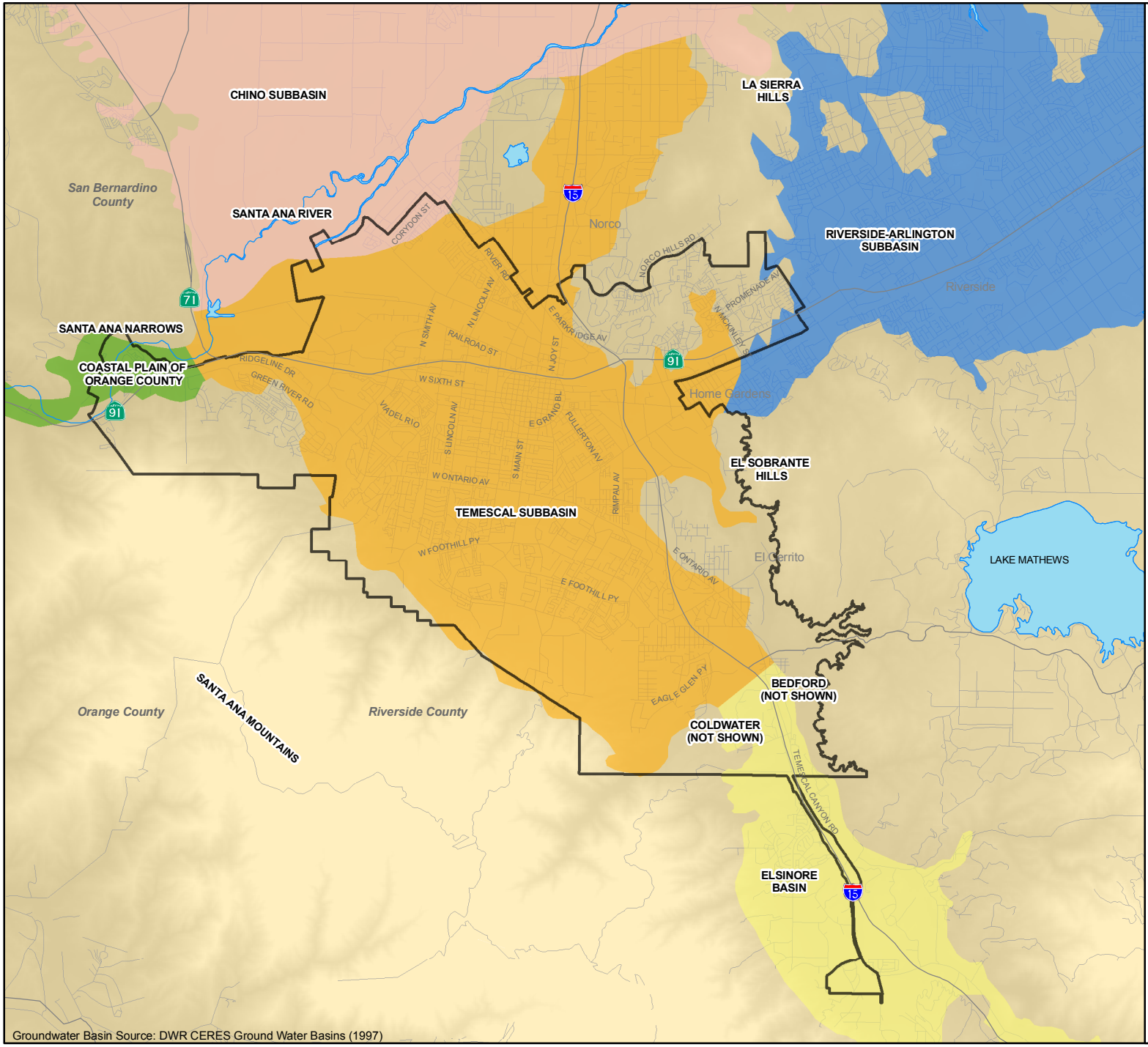

Figure 3.2
Groundwater Basins
Underlying Service Area
2010 Urban Water Management Plan
City of Corona

DATE: 5/3/2011 FILENAME: pw:\\PHX-PDP-PW.Carollo.local:Carollo\Documents\Client\CA\Corona\8567A00\Data\GIS\Figure_2_1-Service_Area.mxd

(Appendix D). The agreement arose because a groundwater well (Trilogy Well), constructed by Elsinore Valley Municipal Water District (EVMWD), was not located in accordance with terms of a previous legal agreement established in 1963.

The new agreement ensures that the City and the EVMWD will be allowed to pump sufficient water from the Coldwater subbasin to meet their respective requirements and to maximize the sustainable use of the Coldwater subbasin as a water supply. According to the agreement, an operating committee will annually determine the amount of groundwater that can be safely extracted from the Coldwater subbasin[8].

3.5.1 Bedford Subbasin

The Bedford subbasin is located south of the Temescal subbasin in Temescal Canyon between the Santa Ana Mountains and the El Sobrante Hills. The basin covers an area of approximately 10 square miles with an alluvial depth ranging from 30 to 200 feet. Groundwater within the basin tends to flow northwest into the Temescal subbasin.

The City has abandoned one potable well in the Bedford subbasin, Well No. 4, and has two non-potable wells that can be used to supplement reclaimed water from the water reclamation facility (WRF). Between 2007 and 2009, an average of just under 300 afy was supplied by the non-potable wells. The City currently does not use the non-potable wells for a continuous source of supply, but they can supplement the reclaimed water system when necessary. With additional treatment, the City may use the wells as a potable supply source in the future.

Other extractors from the basin have been EVMWD and Foothill Properties. EVMWD extracted 616 AF from four wells in 1993, and Foothill Properties extracted 887 AF from three wells in 1993. According to the 2008 GWMP, the City may plan to re-drill this source for future use[9].

3.5.2 Coldwater Subbasin

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 spread in percolation ponds and extracted by the City's three Glen Ivy area wells in the Coldwater subbasin.

The Coldwater subbasin is located southwest of the Bedford subbasin and the Temescal Wash. The basin encompasses an area of approximately 2.6 square miles and lies within the structural graben between the Santa Ana Mountains to the west and the El Sobrante Hills to the east. The Coldwater subbasin is bound by the North Glen Ivy Fault to the northeast. The North Glen Ivy Fault behaves as an effective barrier to groundwater flow and

[8] DWP, 2009
[9] GMP, 2008

prevents migration of groundwater from the Coldwater subbasin into the Temescal Wash. Groundwater levels throughout the basin typically respond rapidly to precipitation and recharge because of the high permeability and limited groundwater storage within this basin.

The City and EVMWD are the two major extractors of groundwater from the Coldwater subbasin. The City currently operates three wells in the Coldwater subbasin. Future production from the Coldwater subbasin is projected to remain static through the year 2030[10].

3.5.3 Temescal Basin

The Temescal subbasin encompasses an area of approximately 26 square miles bound by the Santa Ana River, La Sierra Hills, El Sobrante Hills and the Santa Ana Mountains. Typical depths for the City's wells in the Temescal subbasin range from 180 to 480 feet. Groundwater quality of these wells typically does not meet the EPA and DPH maximum contaminant levels (MCL) for nitrate (45 mg/L). The shallow basin groundwater typically has levels of nitrates ranging from 4.0 to 110 mg/L, some of which require treatment and/or blending to meet regulatory requirements.

3.5.4 Groundwater Levels and Historical Trends

The groundwater subbasins underlying the City have undergone significant changes since groundwater development began in the early 1900s. 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, peaking in the early 1960s but continuing into the 1970s. Increasing urban use has replaced most of that early agricultural demand[11].

Groundwater pumping has varied over time and by subbasin. In the late 1940s, the total amount of groundwater pumping in the subbasins 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 has been less than 25 percent in recent years. Bedford subbasin production is relatively minor and currently is only used to supplement the reclaimed water system when necessary.

Total 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

[10] WMP, 2005a
[11] GMP, 2008

declined to below 10,000 AFY by 1979 and averaged about 9,419 AFY over the next 17 years (1979-1996). During this time, agricultural 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.

Total production in Coldwater subbasin typically ranges from less than 3,000 AFY to more than 10,000 AFY. Since 1980, production has averaged 7,018 AFY.

Production from Bedford subbasin is significantly 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[12]. The City has not supplied its potable water system from the Bedford subbasin since 2000. The City has two non-potable wells which supplement the reclaimed water system from the Bedford subbasin, but currently does not rely upon these for continuous use.

3.5.5 Sources of Recharge and Discharge

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.

Temescal Wash is lined through most of the Corona city limits. 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 stream flow and relatively fine-grained surficial deposits. Other than limited infiltration in this narrow section of the subbasin, Temescal Wash does not contribute significant natural recharge to the Temescal subbasin. However, the City operates three WRFs, two of which provide percolation to groundwater in the Temescal subbasin via wastewater discharge ponds. Volume typically ranges between 4,000 and 10,000 AFY[13].

Watersheds contributing runoff to Coldwater subbasin and Bedford subbasin cover 9,525 acres and 11,858 acres, respectively, more than three times the area of the subbasin. 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.

3.5.6 Groundwater Pumping

The City's annual amount of groundwater pumped by subbasin since the 2005 UWMP is presented in Table 3.3.

[12] GMP, 2008
[13] GMP, 2008

Table 3.3 Amount of Groundwater Pumped by the City of Corona

Basin Name	Historical Groundwater Pumped from Basin (AFY)				
	2006	2007	2008	2009	2010
Temescal Subbasin	21,248	20,093	22,297	20,444	17,664
Bedford Subbasin[1]	151[1]	253[1]	268[1]	326[1]	258[1]
Coldwater Subbasin	3,725	3,517	2,027	3,101	3,131
Total Potable Groundwater Supply[2]	**24,973**	**23,610**	**24,324**	**23,545**	**20,795**
% of Total Water Supply[2]	**57.3%**	**53.1%**	**59.5%**	**62.1%**	**54.1%**

Notes:
1. Supply from Bedford Subbasin is via non-potable wells supplying the reclaimed water system; thus, the quantity from Bedford Subbasin is not included in the potable water total.
2. Excludes reclaimed water and supply from non-potable wells in Bedford Subbasin.

As shown in Table 3.3, the amount of groundwater pumped in the Temescal and Coldwater subbasins has remained fairly consistent over the last 5 years. As mentioned previously, the City does not plan to rely on non-potable wells in the Bedford subbasin in future years.

Table 3.4 breaks down the groundwater supply projections presented in Table 3.1 by basin.

Table 3.4 Amount of Groundwater to be Pumped by the City of Corona

Basin Name	Annual Groundwater Pumped from Basin[1] (AFY)					
	2010[3]	2015	2020	2025	2030	2035
Temescal Subbasin[2]	17,664	17,413	15,730	15,992	16,290	16,612
Bedford Subbasin	0	0	0	0	0	0
Coldwater Subbasin	3,131	3,031	2,737	2,783	2,835	2,891
Total	**20,795**	**20,444**	**18,467**	**18,775**	**19,125**	**19,503**

Notes:
1. Based on the City's supply strategy outlined in the GWMP, supply from groundwater sources is anticipated to be 50 percent of the potable water supply. The supply projections shown here incorporate water conservation targets mandated by the Water Conservation Act of 2009. Treatment losses associated with the Temescal Desalter are not included for future years.
2. As is discussed in Section 3.5.7, the GWMP recommended average pumping of 12,000 AFY in the Temescal Subbasin to prevent overdraft. It is anticipated that the City's efforts at recharging the Temescal Subbasin will enable the projected groundwater pumping in excess of 12,000 AFY.
3. Historical data is presented for 2010. Note that the 2010 total shown in this table is the total flow extracted from the groundwater basin and is greater than the supply shown in Table 3.1 due to flows associated with CWF 19 and 22 and treatment losses associated with the Temescal Desalter.

As shown in Table 3.4, the amount of groundwater pumped is anticipated to be fairly consistent through the planning horizon. These estimates are based on the ratio of water pumped from each basin from 2006 to 2009. It is anticipated that the pumping beyond the identified subbasin balance, discussed below, will be resolved through groundwater recharge. As was shown in Table 3.1 and further discussed in Chapter 5, demand is projected to decline until 2020 in order to meet state conservation goals, and then resume a growth trend.

3.5.7 Basin Overdraft

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 1990 to 2004 period because of decreased pumping rates in the subbasin (data provided in the GWMP indicated a slight decline in precipitation over the same period). The City is working with other subbasin pumpers to control overdraft conditions through pumping limitations. The GWMP discusses an evaluation of enhanced recharge in Coldwater subbasin.

The water balance in Temescal subbasin indicates that overdraft conditions occurred in the last 3 years of the 1990 to 2004 period as average pumping increased from about 10,000 AFY to almost 20,000 AFY. Furthermore, the City will continue 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 has identified numerous strategies for managing groundwater while maintaining groundwater production.

The GWMP identified water balances that would provide a preliminary assessment for the operational range of the subbasins. The GWMP concluded that, assuming no other significant changes in the water balance, average pumping totals of about 12,000 AFY in Temescal subbasin would result in no significant loss of groundwater storage. For the Coldwater subbasin, the GWMP concluded average pumping totals around 4,500 AFY also indicate no significant loss of groundwater storage[14].

3.6 DESALINATED WATER

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long term supply.*

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water and groundwater. Table 3.5 summarizes the City's current projects and future opportunities for desalinated water.

[14] GMP, 2008

Table 3.5 Opportunities for Desalinated Water

Sources of Water	Existing Desalinated Water	Opportunities for Desalinated Water
Ocean Water	None	None
Brackish Ocean Water	None	None
Brackish Groundwater	Temescal Desalter	ICADSP
Other	None	None

As summarized in Table 3.5, there is no opportunity for ocean water desalination directly by the City, but the City currently operates a groundwater desalination plant.

3.6.1 Seawater Desalination

At this time it is neither practical nor economically feasible for the City to implement a seawater desalination program. However, the City could provide financial assistance to other purveyors in exchange for water supplies. A discussion of MWDSC's regional efforts to support desalinated water is included in the Chapter 7 along with the discussion of supply reliability.

3.6.2 Brackish Water and/or Groundwater Desalination

The City currently desalinates groundwater through its Temescal Basin Desalter Treatment Plant/Facility. The City developed its Temescal Desalter to offset demand on MWDSC's imported water supplies. Construction of the desalter was completed in 2001. The Temescal Desalter is located in the northern part of the City adjacent to the City's Corporation Yard and according to the City's 2005 Water Master Plan, has a total rated capacity of 15 mgd. The Temescal Desalter has increased supply reliability, controlled costs, and made better use of scarce resources. The Temescal Desalter serves to reduce nitrate and TDS levels in local groundwater to meet drinking water quality standards (nitrate) and wastewater discharge standard (TDS).

The City has met with the Santa Ana Watershed Project Authority (SAWPA) to investigate participation in the Integrated Chino – Arlington Desalter System Project (ICADSP) to purchase water when the project is implemented. SAWPA estimates that up to 18,000 AFY may be available to participating agencies once the ICADSP is completed.

3.7 RECLAIMED WATER

In 2006, the City began serving reclaimed water to its customers from WRF 3. The City currently provides reclaimed water from two WRFs, WRF 1 and WRF 3. Based on billing records, the reclaimed water distribution system served 199 accounts in 2010, using a total of 3,308 AF. The City's reclaimed water distribution system currently consists of approximately 40 miles of pipeline with two gravity storage reservoirs, one pumped storage

reservoir, four booster pump stations, and two pressure reducing stations[15]. Additional details about the City's reclaimed water system can be found in Chapter 4.

[15] RWMP, 2010

RECLAIMED WATER

This chapter includes information on water reclamation and its potential for use as a water source for the City in accordance with the UWMPA.

> 10633. The plan shall provide, to the extent available, information on reclaimed water and its potential for use as a water source in the service area of the urban water supplier. To the extent practicable, the preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies and shall include all of the following:
>
> 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.
>
> 10633 (b) A description of the reclaimed water currently being used in the supplier's service area, including but not limited to, the type, place and quantity of use.
>
> 10633 (c) A description and quantification of the potential uses of reclaimed water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse determination with regard to the technical and economic feasibility of serving those uses, groundwater recharge, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
>
> 10633 (d) The projected use of reclaimed water within the supplier's service area at the end of 5, 10, 15, and 20 years.
>
> 10633 (e) A description of actions, including financial incentives, which may be taken to encourage the use of reclaimed water, and the projected results of these actions in terms of acre-feet of reclaimed water used per year.
>
> 10633 (f) A plan for optimizing the use of reclaimed water in the supplier's service area, including actions to facilitate the installation of dual distribution systems and to promote recirculating uses.

4.1 COLLECTION AND TREATMENT SYSTEMS

The City currently provides approximately 3,570 AFY of reclaimed water to 199 customers. The existing demand is supplied from the City's WRF 1 and WRF 3. The existing system consists of two service zones, two gravity storage reservoirs, one pumped storage reservoir, four booster pump stations, two storage tanks, two pressure reducing stations, one surge anticipator valve, and approximately 210,000 feet of pipe ranging from 4 inches to 24 inches in diameter[1].

Table 4.1 presents the historical (2005), current (2010), and projected wastewater collection flows as well as the current (2010) and projected volume of water provided to the reclaimed water system.

[1] RWMP, 2010

Table 4.1 Wastewater Collection and Treatment

Type of Wastewater	2005 (AFY)	2010 (AFY)	2015 (AFY)	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)
Wastewater collected & treated in service area(1)	13,395	14,315	15,235	16,155	17,075	17,994	18,914
Volume that meets reclaimed water standard(2)	65(3)	3,308	5,222	6,873	6,873	6,873	6,873

Notes:
1. Collection and treatment figures were generated by linearly interpolating flow projections for 2003 and 2035 from the SMP[2].
2. The 2010 reclaimed water volume is from billing data. Future reclaimed water volume is based on the anticipated plans for expansion discussed in the 2010 RWMP[3]. Based on discussions with City staff, it is anticipated that expansion of the reclaimed water system as discussed in the 2010 RWMP will occur by 2020 and further expansion will not be necessary. Note that only the amount of flow projected for use in the reclaimed water system is shown here. Some of the non-reclaimed wastewater discharged to percolation ponds and the Temescal Creek are treated to tertiary treatment standards as will be discussed later.
3. Based on average demand of Butterfield Park. The City supplied Butterfield Park with reclaimed water prior to the rest of the reclaimed water system as a part of a pilot project.

The projections of wastewater flow shown in Table 4.1 are derived from the City's 2005 Sewer Master Plan[4]. The projections were generated by linearly interpolating flow projections for 2003 and 2035 from the SMP. The 2010 reclaimed water volume is from the City's current Reclaimed Water Master Plan (RWMP)[5]. For 2010, approximately 25 percent of wastewater collected in the City was supplied to the reclaimed water system.

Table 4.2 shows the capacity of the City's WRFs and provides anticipated future expansion capacities based on the 2010 RWMP.

Table 4.2 Water Reclamation Facilities

Water Reclamation Facility	Flow (mgd)			
	Current Plant Capacity	Current Tertiary Filter Rating	Future Plant Capacity	Future Tertiary Filter Rating
1	11.5	9.0	15.5	15.5
2	3.0	-	6.0	3.0
3	1.0	1.0	5.0	5.0
Total	**15.5**	**10.0**	**26.5**	**23.6**

Notes:
1. The plant capacities and anticipated future plant capacities are from the 2010 RWMP[6].

There are currently plans for both tertiary treatment capacity and total treatment capacity to be expanded in the future. While only two of the three WRFs are currently capable of

[2] SMP, 2005c
[3] RWMP, 2010
[4] SMP, 2005c
[5] RWMP, 2010
[6] RWMP, 2010

providing tertiary treatment to wastewater, all three facilities are planned to have a tertiary filter rating in the future.

The City has commissioned a study to examine capital and operational costs for existing and expanded plant capacity. That study will make recommendations as to whether the City should continue to operate three plants or revise expansion plans to operate only two. However, expansion of reclaimed water production would be consistent with that total capacity planned.

Table 4.3 presents the current and projected disposal of non-reclaimed wastewater.

Table 4.3 Disposal of Non-Reclaimed Wastewater

Method of Disposal	Treatment Level	Annual Discharge Flow (AFY)					
		2010	2015	2020	2025	2030	2035
Percolation Ponds	Secondary	6,225	-	-	-	-	-
Percolation Ponds	Tertiary	-	8,961	8,961	8,961	8,961	8,961
Temescal Creek	Tertiary	3,063	5,495	5,495	5,495	5,495	5,495
Total		**9,288**	**14,457**	**14,457**	**14,457**	**14,457**	**14,457**

Notes:
1. Data provided by City

As shown in Table 4.3, annual discharge flow for disposal of wastewater is projected to remain relatively constant. This is mostly due to projected increases in reclaimed water use in the City.

Wastewater from City WRFs that is not sent to the reclaimed water distribution system is discharged to percolation ponds. During periods of low irrigation demand, the City's WRFs discharge tertiary treated water to Temescal Creek.

4.2 CURRENT RECLAIMED WATER USES

The City currently provides reclaimed water for irrigation uses and occasional use for construction waters. Reclaimed water customers include golf courses, parks, landscape maintenance districts, schools, dual plumbing, agriculture, and freeway landscaping.

The City's existing reclaimed water demands are 3,570 AFY. The City expanded its reclaimed water system significantly, increasing the number of customer accounts to 199 in 2010 since initially constructing its reclaimed water distribution system in 2006.

As is common with reclaimed water systems primarily supplying landscape irrigation demands, the high demand months are typically June through August. The low demand

months are typically December through February. Due to the reclaimed water system's recent expansion, the monthly variation for the past few years is not representative of typical seasonal variation (since many new customers were being brought on-line at different times of the year)[7].

Table 4.4 presents a comparison of the 2005 UWMP projected reclaimed water use for 2010, from actual 2010 use.

Table 4.4 2005 UWMP Projected 2010 Reclaimed Water Use Compared to 2010

User Type	Treatment Level	Reclaimed Water (AFY)	
		2010 Projection from 2005 UWMP	2010 Actual Use(1)
Agricultural	Tertiary	-	59.7
Landscape(2)	Tertiary	7,842	3,248.0
Dual Plumbing	Tertiary	-	0.3
Total		**7,842**	**3,308.0**

Notes:
1. Based on 2010 billing records. For the dual plumbing customer, typical annual usage is estimated as 0.5 afy (customer came online part way through 2010).
2. Landscape irrigation for commercial, government, City, and HOA uses are consolidated under landscape irrigation.

As shown in Table 4.4, in 2010 the City's reclaimed water system served a total of 3,308 AFY of reclaimed water demands; whereas it had been projected in 2005 that the reclaimed system would provide 7,842 AFY by 2010.

Since the 2005 UWMP, the City completed the 2010 RWMP, which performed a market assessment, quantifying potential reclaimed water demands. The 2010 RWMP provides an existing system demand of 3,570 AFY, which will be used as the existing system demand in this study (for purposes of establishing potable offsets for reclaimed water).

4.3 POTENTIAL USES AND PROJECTED DEMAND

The City undertook a reclaimed water market assessment as a part of its 2010 RWMP to determine future reclaimed water demands and identify areas of the City that could be economically served reclaimed water. Based on the recommendations of the 2010 RWMP, the projected reclaimed water demand is 6,873 AFY. The City anticipates that expansion of the reclaimed water system to serve the potential demand would occur by 2020. The reclaimed water projections are presented in Table 4.5.

[7] RWMP, 2010

Table 4.5 Reclaimed Water Demand Projections

User Type[1]	Treatment Level	Projected Reclaimed Water Demand[2] (AFY)					
		2010[3]	2015	2020	2025	2030	2035
Agricultural	Tertiary	59.7	60	60	60	60	60
Landscape[4]	Tertiary	3,248.0	5,161	6,812	6,812	6,812	6,812
Dual Plumbing	Tertiary	0.3	1	1	1	1	1
Total		**3,308.0**	**5,222**	**6,873**	**6,873**	**6,873**	**6,873**

Notes:
1. The 2010 RWMP only identified irrigation demands. However, the City currently supplies a dual plumbing customer and reclaimed water hydrants. Agricultural irrigation was assumed to remain relatively consistent. Dual plumbing was assumed to follow a similar percentage as is currently used. Hydrants are assumed to have negligible demand and are not listed. It is anticipated that cooling water could also be a potential reclaimed water use type; however, since no specific customers were identified, usage is not listed separately in this table.
2. Future reclaimed water volume is based on the anticipated plans for expansion discussed in the 2010 RWMP[8]. Based on discussions with City staff, it is anticipated that expansion of the reclaimed water system as discussed in the 2010 RWMP will occur by 2020 and further expansion beyond this will not be necessary.
3. Historic demand, not a projection. Reclaimed water demand in 2010 is from billing data. Note that an existing system demand of 3,570 AFY will be used as the existing system demand for establishing potable offsets.
4. Landscape irrigation for commercial, government, City, and HOA uses are consolidated under landscape irrigation.

4.4 INCENTIVES AND PLANNING

The City's plans for expansion of its reclaimed water system were updated in the 2010 RWMP. Based on the demand projections in the RWMP, the City's future reclaimed water system is anticipated to provide an average of 6,873 AFY of reclaimed water to 455 customers. This expansion was based on the market assessment described above and reflects customer interest in the supply. The primary incentive provided to future customers is a higher level of reliability of the supply.

Additionally, the reclaimed rate structure offers a fiscal incentive through a less expensive rate per unit compared to the residential outdoor water rate and the commercial, industrial, institutional and government water rate. As shown in Table 4.6, currently reclaimed water is approximately 68 percent of the cost of potable water per unit of the outdoor residential or commercial rate. At higher levels of usage, reclaimed water rates are progressively lower.

[8] RWMP, 2010

Table 4.6 Comparison of Reclaimed and Potable Rates

Tier	Basis of Tier	Potable Commercial Rate ($/hcf)	Reclaimed Rate ($/hcf)	Percent of Potable Commercial Rate in Same Tier
Water Budget	-	$2.04	$1.39	68%
Inefficient Tier	1% to 20% over Water Budget	$2.78	$2.08	75%
Excessive Tier	21% to 40% over Water Budget	$5.56	$2.78	50%
Wasteful Tier	Above 40% over Water Budget	$10.19	$4.16	41%

This pricing structure offers an economic reward for customers who utilize the reclaimed water system.

The 2010 RWMP also outlines further improvements for the tertiary treatment capacity and storage capacity as well as distribution system improvements, including laying an additional 23 miles of pipeline. Two new pump stations are also currently planned, to bring the City's total number of reclaimed pump stations up to six.

WATER DEMAND AND CONSERVATION

The UWMPA requires that the UWMP demonstrate that sufficient water supplies will be available to meet the next 25 years of projected water demands.

> *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 subdivision (a) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020*

This chapter will discuss the water conservation baseline and targets associated with the Water Conservation Act of 2009. Historical demand data will then be presented, followed by demand projections and a discussion of anticipated development projects.

5.1 WATER CONSERVATION

5.1.1 Water Conservation Target Methods per SBx7-7

The Water Conservation Act of 2009[1], enacted November 2009, is the new law governing water conservation in California. This law requires that all water suppliers increase water use efficiency with the overall goal to decrease per-capita consumption within the state by 20 percent by 2020. The bill requires that DWR develop certain criteria, methods, and standard reporting forms through a public process that can be used by water suppliers to establish their baseline water use and determine their water conservation goals. DWR provided four different methods to establish water conservation targets. These four methods can be summarized as follows:

- **Method 1 – Baseline Reduction Method.**
  The 2020 water conservation target of this method is defined as a 20-percent reduction of average per-capita demand during a 10-year continuous baseline period that should end between 2004 and 2010.
- **Method 2 – Efficiency Standard Method.**
  The 2020 water conservation target of this method is based on calculating efficiency standards for indoor use separately from outdoor use for residential sectors and an overall reduction of 10 percent for commercial, industrial, and institutional (CII) sectors. The aggregated total of the efficiency standards in each area is then used to create a conservation target.

[1] SBx7-7

- **Method 3 – Hydrologic Region Method.**
  This method uses the ten regional urban water use targets for the state. Based on the water supplier's location within one of these regions, a static water use conservation target for both 2015 and 2020 is assigned.
- **Method 4 – BMP-Based Method.**
  This method uses previous BMPs of a supplier in order to establish a conservation target for 2020. Depending on how aggressively the water supplier has pursued water reduction and conservation in the past, a new conservation target for 2020 will be assigned.

5.1.2 City's Water Conservation Targets

Method 1 establishes baseline per-capita water consumption in gpcd based on historical population and historical demand. Any 10-year consecutive period between 1995 and 2010 can be selected to establish the baseline per-capita demand for the water supplier using the average per-capita consumption in gpcd from that 10-year period. If an agency uses 10 percent or more reclaimed water in year 2008, the baseline value can also be determined with a 15-year consecutive period between 1990 and 2010. As shown in Table 5.1, the City's reclaimed water usage was just under the 8 percent criteria in 2008. Thus, the baseline period must be 10 years in length and end between 2004 and 2010.

Table 5.1 Base Period Ranges

Base	Parameter	Value	Units
Water Deliveries	2008 total water deliveries	42,213	AF
	2008 total volume of delivered reclaimed water	3,040	AF
	2008 reclaimed water as a percent of total deliveries	7	%
10-Year Base Period	Number of years in base period	10	years
	Year beginning base period range	1996	
	Year ending base period range	2005	
5-Year Base Period	Number of years in base period	5	years
	Year beginning base period range	2005	
	Year ending base period range	2009	

The baseline value is then reduced by 20 percent to determine the year 2020 conservation target. The intermediate target for year 2015 is the mid-point value between the baseline and year 2010 target values.

In addition to the 10-year baseline period, a 5-year period needs to be selected in any year ending no earlier than 2007 to determine the minimum required reduction in water use. The selected 10-year and 5-year base period ranges are summarized in Table 5.1.

Table 5.1 shows the characteristics of the 10- and 5-year period selected as the baselines for the City in meeting the Water Conservation Act of 2009.

The City's historical water consumption for the period 1995 through 2010 is shown on Figure 5.1. This figure also depicts the minimum and maximum 10-year baseline values. As shown, the 10-year period with the highest baseline consumption starts in 1996 and ends in 2005.

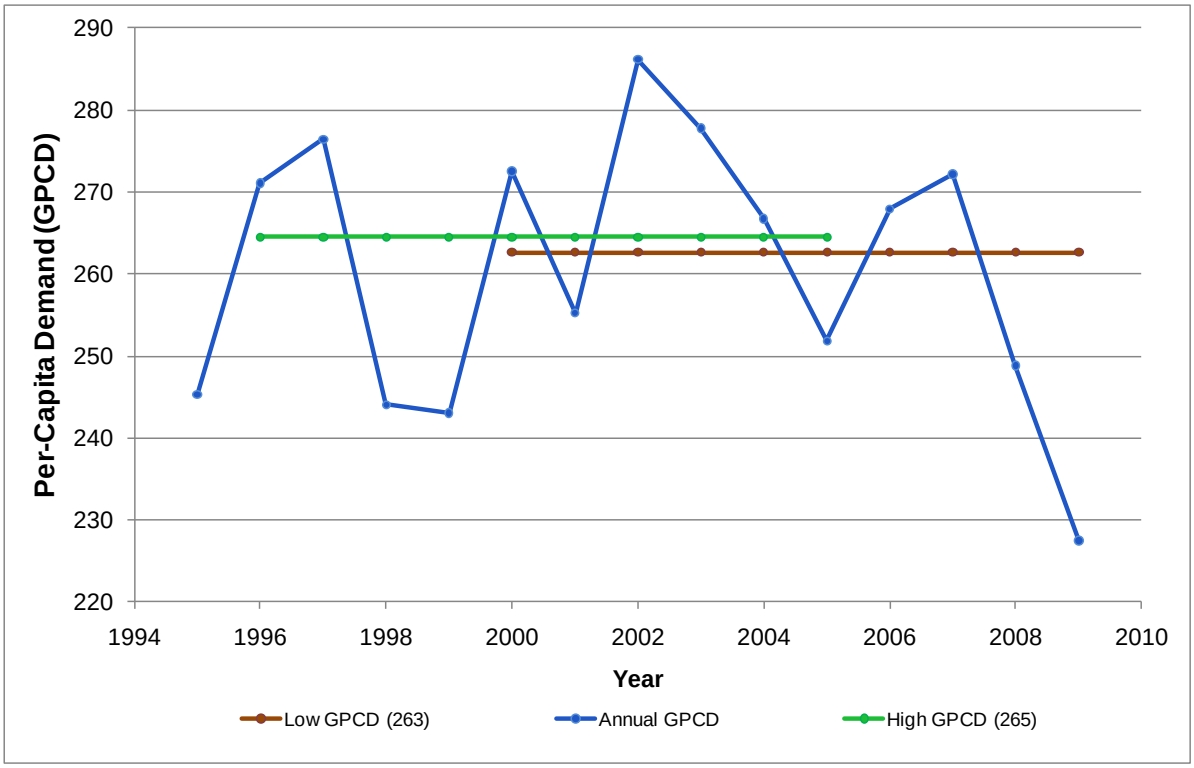

Figure 5.1 Historical Consumption

As shown on Figure 5.1, although the yearly per-capita demands vary significantly between 1995 and 2009, the high and low averages are relatively close in value. Although more recent per-capita demand values show a decline compared to previous years, the historical baselines are both close to 264 gpcd.

Table 5.2 shows the City population, total volume of consumption, and the per-capita consumption of the selected 10-year baseline period. The average per-capita consumption during this period was 265 gpcd. Based on Method 1, a 20-percent reduction from this baseline period determines the City's 2020 conservation target at 212 gpcd.

Table 5.2 Base Daily Per Capita Water Use – 10 Year Range

Base Period Sequence	Calendar Year	Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Year 1	1996	100,146	27.2	271
Year 2	1997	105,743	29.2	276
Year 3	1998	112,148	27.4	244
Year 4	1999	118,493	28.8	243
Year 5	2000	124,966	34.1	273
Year 6	2001	129,723	33.1	255
Year 7	2002	134,694	38.6	286
Year 8	2003	138,616	38.5	278
Year 9	2004	143,947	38.4	267
Year 10	2005	144,603	36.4	252
Average	**N/A**	**125,308**	**33.2**	**264.5**

Notes:
1. Historic population data are taken from Chapter 2, based on DWR methodology.

Table 5.3 shows the population, total volume of consumption, and the per-capita consumption of a 5-year baseline period. The 5-year baseline value is used to determine the minimum required reduction in water use.

Table 5.3 Base Daily Per Capita Water Use – 5 Year Range

Base Period Sequence	Year Calendar	Population	Daily System Gross Water Use (mgd)	Annual Daily Per Capita Water Use (gpcd)
Year 1	2003	138,616	38.5	278
Year 2	2004	143,947	38.4	267
Year 3	2005	144,603	36.4	252
Year 4	2006	145,295	38.9	268
Year 5	2007	145,848	39.7	272
Average		**143,662**	**38.4**	**267.3**

As shown in Table 5.3, the average consumption in the period 2003 through 2007 was 267 gpcd. The minimum per-capita consumption for year 2020 is defined as 95 percent of this value, reflecting a minimum water conservation of 5 percent. This equates to a minimum water conservation target of 254 gpcd.

As the water conservation target from the 10-year baseline period (212 gpcd) is lower than the minimum water conservation target (254 gpcd), the City's water conservation targets are as follows:

- Year 2015 Target: 238 gpcd (10-percent reduction).
- Year 2020 Target: 212 gpcd (20-percent reduction).

5.1.3 Demand Projections with Water Conservation

Table 5.4 presents City demand projections ("Water Demand without Conservation") based on the baseline per-capita demand of 265 gpcd described in Section 5.1.2 and the population projections discussed in Chapter 2.

Table 5.4 also shows the demand projections incorporating the water conservation targets associated with the Water Conservation Act of 2009 ("Water Demand with 20x2020 Conservation"). This represents the demand the City is required to meet based on the mandated water conservation targets assuming the population growth discussed in Chapter 2.

As discussed in Chapter 4, the City has made significant efforts in development of its reclaimed water (RW) system over the past five years and plans to expand its reclaimed water system over the next decade. Since the demand in the 2010 RWMP consisted of existing potable customers, it is anticipated that the growth in reclaimed water demands will offset potable water demands. In addition, the selected baseline period (1996 through 2005) reflects per-capita demands prior to development of the City's reclaimed water system. Thus, it is assumed that the entire projected reclaimed water demand be deducted as a potable offset since the baseline per-capita demand does not reflect any reclaimed water usage. The potable offset from reclaimed water is shown in Table 5.4 ("Potable Offsets from RW") along with the resulting demand projections with the potable offsets deducted ("Water Demand without Conservation with RW Offset").

Table 5.4 Demand Projections

Year	Population(1)	Water Demand without Conservation (AFY)(2)	Water Demand with 20x2020 Conservation (AFY)	Potable Offsets from RW (AFY)(3)	Water Demand without Conservation with RW Offset (AFY)(4)
2010	149,622	44,331	44,331	3,570	40,761
2015	153,335	45,431	40,888	5,222	40,209
2020	155,819	46,167	36,934	6,873	39,294
2025	158,421	46,938	37,551	6,873	40,065
2030	161,370	47,812	38,250	6,873	40,939
2035	164,558	48,757	39,005	6,873	41,884

Notes:
1. Population projections are taken from Chapter 2, based on SCAG / WRCOG population projections.
2. Before reclaimed water offsets
3. See Table 4.1 in Chapter 4
4. Water Demand Without Conservation minus Potable Offsets from reclaimed water

As shown in Table 5.4, the City's demand is projected to reach almost 50,000 AFY by 2035. However, incorporating water conservation targets reveal that future demand will be lower than this initial estimate. The Water Conservation Act of 2009 requires a 20% reduction from the historic baseline, reducing the projected demand of 46,167 AFY to 36,934 AFY in 2020. Even without conservation efforts, project reclaimed water use will lower potable demand projections to the Demand without Conservation with RW Offset shown above.

Year 2015 serves as an interim point, with projected per-capita consumption between the current usage amount and the 2020 conservation target.

Note that demands shown for year 2010 were based on the same projection as the rest of the demand projection years which reflects historic trends over the last several years. The actual water demand in 2010 was 32,645 af, significantly lower than the projected demand for 2010. Some of this decreased demand is believed to be due to water conservation as well as weather and economic downturn.

Some reduction is already accounted for by the reclaimed water values shown in Table 5.4. In 2020, reclaimed water use is projected to reach 6,873 af, which will reduce potable water demand by the same amount. Further conservation will be necessary however. The following section discusses the various BMPs available for the City's to achieve this reduction in water use.

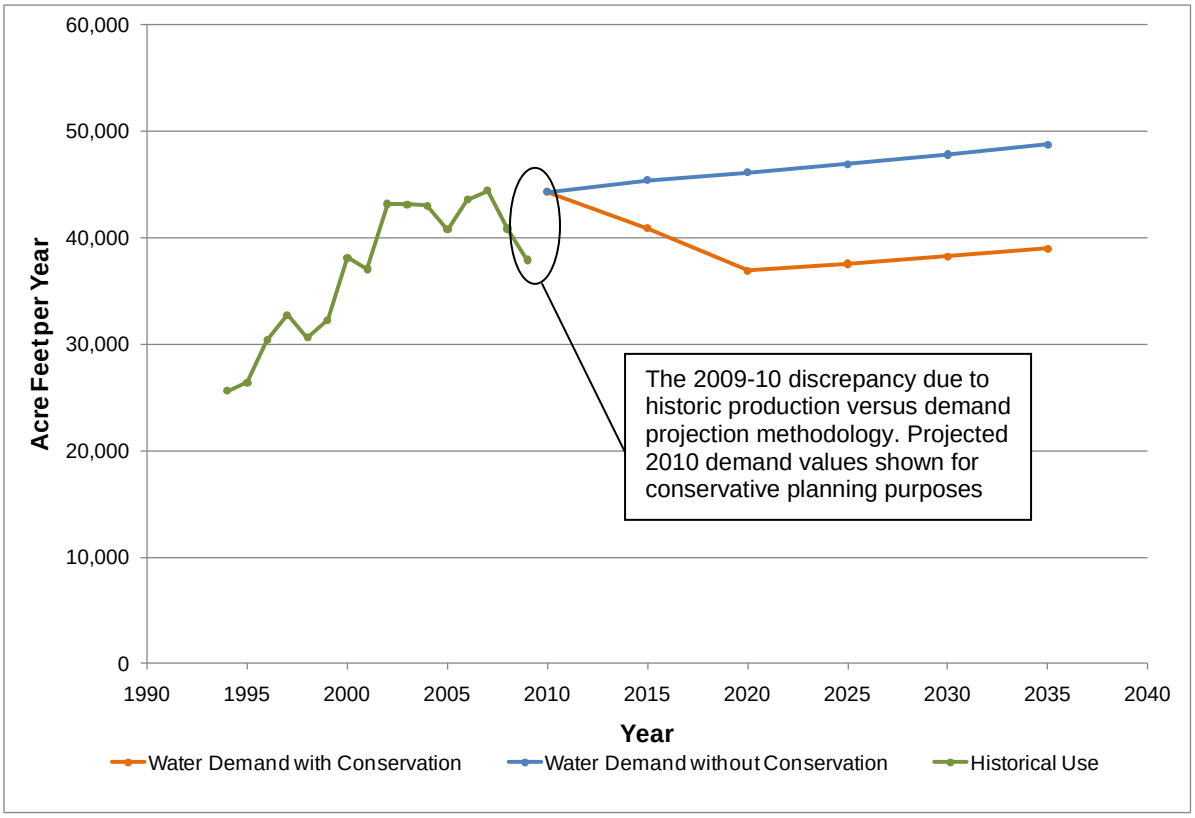

Figure 5.2 Projected Water Demands with and without Conservation

5.2 PAST, CURRENT, AND PROJECTED WATER USE

The UWMPA requires that the UWMP identify the quantity of water supplied to the agency's customers including a breakdown by user classification.

UWMPA:

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (b) (3) 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 records.*
>
> *10631 (e) (1) Quantify, to the extent records are available, past and current water use, over the same 5-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors including, but not necessarily limited to, all of the- following uses:*
>
> *(A) Single-family residential; (B) Multi-family; (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; and (I) Agricultural.*
>
> *(2) The water use projections shall be in the same 5-year increments to 20 years or as far as data is available.*

Water demands served by the City are primarily from residential land uses, with commercial, industrial, and institutional uses comprising approximately 19 percent of total usage between 2007 and 2009. As of 2010, the City maintains approximately 41,354 water meters.

5.2.1 Historical Water Use

Water demands (or water use) represent water that leaves the distribution system through metered or unmetered connections or at pipe joints (leaks) or breaks. Water demands occur throughout the distribution system based on the number and type of consumers in each location. Annual historical water demands within the City's service area between 1994 and 2009 are presented in Table 5.5 along with population and per capita demand.

Water demands shown in Table 5.5 are based on fiscal year consumption figures provided by the City. The annual population was obtained from the California Department of Finance (DOF). It reflects historical population within the City. As discussed in Section 2.3, the water distribution system service area has a population of the approximately 5,000 additional people when compared to the City boundary.

Table 5.5 Historical Water Use

Year	Demand (AFY)	Population[1]	Per Capita Consumption (gpcd)
1994	25,635	93,232	245
1995	26,402	96,099	245
1996	30,408	100,146	271
1997	32,746	105,743	276
1998	30,662	112,148	244
1999	32,262	118,493	243
2000	38,152	124,966	273
2001	37,084	129,723	255
2002	43,176	134,694	286
2003	43,131	138,616	278
2004	43,011	143,947	267
2005	40,794	144,603	252
2006	43,606	145,295	268
2007	44,460	145,848	272
2008	40,865	146,620	249
2009	37,914	148,770	228
Average	**29,515**	**101,447**	**260**

Notes:
1. Historic population estimates were obtained from the California Department of Finance[2,3] for the City.

As shown in Table 5.5, the City's demands increased over the last 16 years, growing from 25,000 AFY to more than 40,000 AFY, while the population has increased dramatically over the same time period, from about 90,000 to almost 150,000.

5.2.2 Per-Capita Consumption

Per-capita demands are calculated by dividing the total system demands by the City's population. The resulting number is the average number of gallons consumed, per person, per day for that year. Annual per-capita demands are included in Table 5.5. Over the last 16 years, the per-capita consumption has ranged between 220 and 290 gpcd. As shown, the City's average per-capita demand over the last 16 years was 260 gpcd.

[2] DOF, 2000
[3] DOF, 2010

5.2.3 Projected Water Use

Demand projections based on estimates of population growth over the next 25 years and the water conservation targets discussed previously are shown in Table 5.6. The per-capita consumption targets are included for reference. Note that 2010 is included as a projection demand. As discussed previously, actual 2010 demand was 32,645 afy. The projected demand of 44,331 afy is included in this table for conservative planning purposes.

Table 5.6 Demand Projections

Year	Demand[1] (AFY)	Population[2]	With County[3] (+5,000)	Per Capita Consumption (gpcd)
2010[4]	44,331	149,622	154,622	265
2015	40,888	153,335	158,335	238
2020	36,934	155,819	160,819	212
2025	37,551	158,421	163,421	212
2030	38,250	161,370	166,370	212
2035	39,005	164,558	169,558	212

Notes:
1. Demand projections are based on water conservation targets associated with the Water Conservation Act of 2009.
2. Population projections from discussion in Chapter 2.
3. As discussed in Section 2.3, the water distribution system service area has a population of the approximately 5,000 additional people when compared to the City boundary. This population is associated with unincorporated areas of Riverside County.
4. Demand shown for 2010 is a projected demand based on the baseline per-capita usage, and does not reflect historical usage in 2010.

As shown in Table 5.6, the City's demands are anticipated to decrease in years 2015 and 2020 as the City meets the required water demand targets associated with the Water Conservation Act of 2009. Over this time, the mandated reduction in demand outpaces the growth of population. After 2020, it is assumed that the per-capita demand will remain consistent with the water conservation target, and overall demand will increase with population growth.

5.3 WATER DELIVERIES

The City classifies meters within its potable water distribution system into the following categories: single-family residential (SFR), multi-family residential (MFR), commercial, industrial, institutional, landscape, and reclaimed water. The current and projected water deliveries from Table 5.6 broken down by sector are presented in Table 5.7. Historical demand from 2005 is also included in Table 5.7 for comparison.

Table 5.7 Water Demand Projections

Use	2005		2010		2015		2020		2025		2030		2035	
	# of accounts[1]	Demand (AFY)	# of accounts[1]	Demand[2](AFY)	# of accounts[1]	Demand (AFY)	# of accounts[1]	Demand (AFY)	# of accounts[1]	Demand (AFY)	# of accounts[1]	Demand (AFY)	# of accounts[1]	Demand (AFY)
SFR	24,018	24,127	25,745	26,219	26,748	24,183	27,181	21,844	27,635	22,209	28,149	22,622	28,705	23,069
MFR	2,845	2,858	3,049	3,105	3,168	2,864	3,219	2,587	3,273	2,630	3,334	2,679	3,400	2,732
Commercial	3,846	3,863	4,122	4,198	4,283	3,872	4,352	3,498	4,425	3,556	4,507	3,622	4,596	3,694
Industrial	1,486	1,493	1,593	1,622	1,655	1,496	1,681	1,351	1,710	1,374	1,741	1,399	1,776	1,427
Institutional	2,529	2,540	2,710	2,760	2,816	2,546	2,862	2,300	2,909	2,338	2,964	2,382	3,022	2,429
Landscape	3,826	3,843	4,101	4,177	4,261	3,852	4,330	3,480	4,402	3,538	4,484	3,604	4,573	3,675
Agricultural	31	31	33	33	34	31	35	28	35	28	36	29	37	29
Other – Water Loss (5%)[3]		2,040		2,217		2,044		1,847		1,878		1,912		1,950
Total	**38,579**	**40,794**	**41,354**	**44,331**	**42,964**	**40,888**	**43,660**	**36,934**	**44,389**	**37,551**	**45,215**	**38,250**	**46,109**	**39,005**

Notes:
1. Number of accounts shown is tied to population for each projected year. Number of accounts and account type breakdown based on customer type averages from 2007, 2008, and 2009.
2. Demand shown for 2010 is a projected demand based on the baseline per-capita usage, and does not reflect historical usage in 2010.
3. Water loss represents the unmetered water amount (production – consumption) which is assumed to be 5 percent.

Reclaimed water offsets are not included in conservation projections used in Table 5.7. See the discussion in Section 5.1.3 for more details on reclaimed water offsets and the projected demands.

The City does not have any unmetered accounts and is planning to continue installing meters for all future accounts. Water losses within the City's distribution system are estimated at 5 percent (based on historical data) and listed as unmetered deliveries.

While the City does not wholesale water to other agencies, the City of Norco obtains wholesale water from WMWD which is wheeled through the City's potable water distribution system. This amount is not included in City demands.

As shown in Table 5.7, projected water usage is slated to decrease in order to meet 2020 conservation targets. The decrease in demand is a product of projections which take future conservation goals into account. While projected demands are calculated to decrease in order to meet conservation goals, projected account numbers are tied to population growth. Accounts are therefore projected to continue increasing at a normal rate along with population growth despite the drop in demand. It is important to note that this assumption implies that future water consumption will be due to a decrease in usage per account, rather than a system wide reduction of total accounts.

The average breakdown of the number of accounts by account type between 2007 and 2009 is depicted graphically on Figure 5.3.

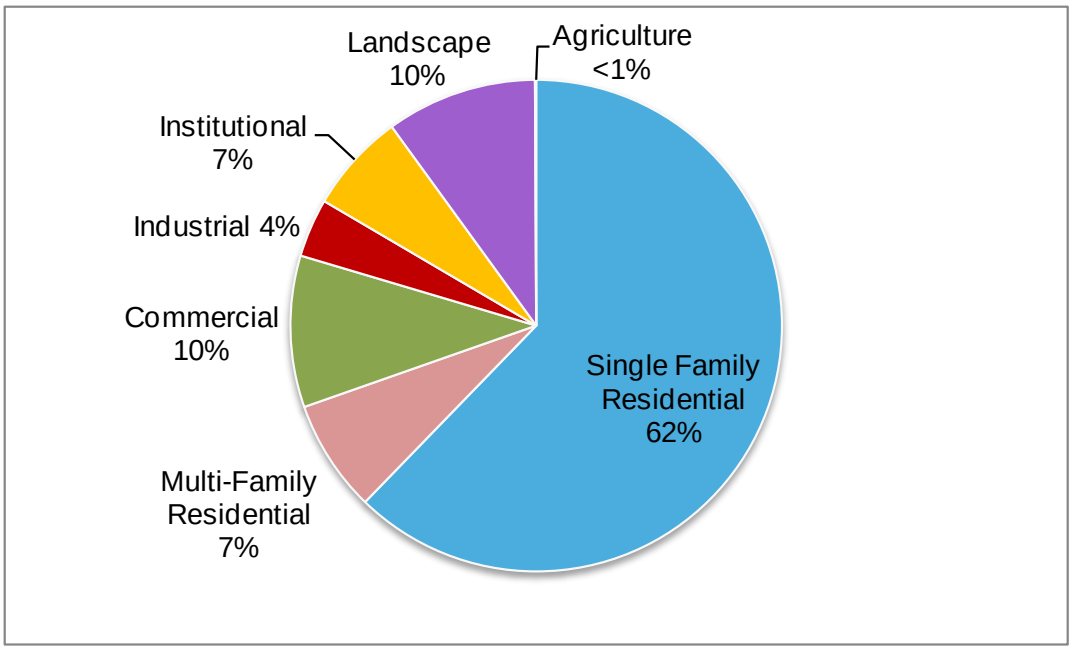

Figure 5.3 Number of Accounts by Account Type (3-year average)

As shown on Figure 5.3, residential uses comprise the majority of accounts, with single family residential representing 62 percent and multi-family representing 7 percent of total account distribution. Landscape and commercial each comprise 10 percent of the City's accounts, while institutional, industrial and agricultural are 7 percent, 4 percent, and less than 1 percent, respectively. These percentages were used to project the number of accounts by type shown in Table 5.7. The total number of accounts for each projected year was determined by using the average account-to-demand ratio for the average of years 2007, 2008, and 2009. This ratio was applied to non-conservation water demand for all projected years.

5.4 NEW DEVELOPMENT PROJECTS

The UWMPA requires that the UWMP identify future major developments within the agency's service area that would require water supply planning.

> *10910. (a) Any city or county that determines that a project, as defined in Section 10912, is subject to the California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) under Section 21080 of the Public Resources Code shall comply with this part.*
>
> *10912. For the purpose of this part, the following terms have the following meanings:*
>
> *10912 (a) "Project" means any of the following:*
>
> *(1) A proposed residential development of more than 500 dwelling units.*
> *(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.*
> *(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.*
> *(4) A proposed hotel or motel, or both, having more than 500 rooms.*
> *(5) A proposed industrial, manufacturing or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.*
> *(6) A mixed-use project that includes one or more of the projects specified in this subdivision.*
> *(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.*

City staff identified the Arantine Hills as the major development planned within its service area.

The Arantine Hills Specific Plan is entirely located within the City water supply service area. A Water Supply Assessment (WSA) for the Arantine Hills Specific Plan was prepared in September 2010[4]. The City would serve water to the proposed local and master planned facilities. The water distribution systems would be designed to satisfy the water

[4] WSA, 2010

requirements for residential, commercial, recreational, landscaping and fire-fighting purposes associated with the development.

The proposed project would create a master-planned community that includes a balanced residential, commercial and mixed-use development, as well as open space/recreation uses. The project entails approximately 130 acres of residential development providing 1,621 detached and attached single-family homes and multi-family dwellings, 38 acres of general commercial land uses, 39 acres of mixed-use development with a total of 451 mixed-use residential units, 37 acres of open space, and 15 acres of park land. The proposed project would integrate these land uses through construction of public and private streets and pedestrian/bike trail circulation system. The proposed project has a water demand of approximately 709 AFY. According to the WSA, the development will include 35 acres of high-density residential housing with an estimated 621 high-density dwelling units.

To reduce the proposed project's demand for potable water, an extension of the existing reclaimed water distribution system in the neighboring Eagle Glen development would provide reclaimed water for landscape irrigation in street rights-of-way, open space, slopes and parks, street parkways, entry monuments, fuel modification areas, as well as in commercial and industrial areas within the project. The City will have more than sufficient supplies of reclaimed water to meet the anticipated needs of the proposed project, a maximum demand of 294 AFY for all exterior irrigation.

5.5 LOW INCOME HOUSING

The UWMPA requires that the UWMP identify low income housing developments within the agency's service area and develop demand projections for those units.

> 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

The Housing Element of the City's General Plan provides information on Regional Housing Needs Allocation Progress (RHNA). This element of the update contains plans to construct low and very low income housing units by 2014. A total of 1,379 of these low income dwelling units are in construction or remain to be built before the 2014 deadline.

As shown in Table 5.8, assuming the 1,379 dwelling units reflect the SCAG defined average of 3.19 people per dwelling unit, the projected 2020 per capita water usage of 212 gpcd, would result in a total of 1,045 afy of low income housing water consumption in the year 2020. Using the interim target of 238 gpcd, the 2015 low income housing water consumption would be 1,173 afy.

Table 5.8 Low Income Projected Water Demands

	Demand (afy)				
	2015	**2020**	**2025**	**2030**	**2035**
Low Income Housing	1,173	1,045	1,045	1,045	1,045

Notes:
(1) Based on planned low income housing development as described in the City's General Plan. The General Plan projects housing needs through 2014.

BEST MANAGEMENT PRACTICES

6.1 BEST MANAGEMENT PRACTICES

The City is a signatory to the Memorandum of Understanding (MOU) regarding urban water conservation in California and is, therefore, a member of the California Urban Water Conservation Council (CUWCC). The City became a signatory to the MOU on March 3, 1996 and submits bi-annual reports to the CUWCC outlining progress towards implementing the 14 BMPs in the MOU. BMPs are conservation practices that have been identified by the CUWCC: conferences, BMP workshops, free publications, research regarding water management practices, leadership on water legislation and networking with other agencies and special interest groups, for example.

The City has, in good faith, tried to address and comply with all of the BMP targets listed in the CUWCC MOU except BMP Number 10, which applies only to wholesale agencies and is not reported in this plan.

BMP signatories can submit their most recent BMP Report with their UWMP to address the urban water conservation issues in the UWMPA. The City's BMP Reports are included in Appendix G.

As a member of CUWCC and signatory of its MOU, the City realizes the importance of the BMPs to ensure a reliable future water supply. The City is committed to implementing water conservation and water reclamation programs to maximize sustainability in meeting future water needs for its customers.

Corona's previous UWMP provided information regarding the City's conservation measures already in place and those that would improve the efficiency of water use within the City.

UWMPA:

10631 (f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:

(1) A description of each water demand management measure that is currently being implemented, or scheduled for implementation, including the steps necessary to implement any proposed measures, including, but not limited to, all of the following:

- *(A) Water survey programs for single-family residential and multifamily residential customers.*
- *(B) Residential plumbing retrofit.*
- *(C) System water audits, leak detection, and repair.*
- *(D) Metering with commodity rates for all new connections and retrofit of existing connections.*
- *(E) Large landscape conservation programs and incentives.*
- *(F) High-efficiency washing machine rebate programs.*
- *(G) Public information programs.*
- *(H) School education programs.*
- *(I) Conservation programs for commercial, industrial, and institutional accounts.*
- *(J) Wholesale agency programs.*
- *(K) Conservation pricing.*
- *(L) Water conservation coordinator.*
- *(M) Water waste prohibitions.*
- *(N) Residential ultra-low-flush toilet replacement programs.*

Table 6.1 BMP Naming Changes

Old BMP Number and Name	New BMP Category
BMP 1 - Water Survey Programs	Programmatic: Residential
BMP 2 - Residential Plumbing Retrofit	Programmatic: Residential
BMP 3 - Water System Audits	Foundational: Utility Operations – Water Loss Control
BMP 4 - Metering with Commodity Rates	Foundational: Utility Operations – Metering
BMP 5 - Landscape Irrigation Programs	Programmatic: Landscape
BMP 6 - Washing Machine Rebate Program	Programmatic: Residential
BMP 7 - Public Information Program	Foundational: Education – Public Information Program
BMP 8 - School Education Program	Foundational: Education – School Education Programs
BMP 9 - Commercial, Industrial, and Institutional Conservation Programs	Programmatic: Commercial, Industrial, and Institutional
BMP 10 - Wholesale Agency Programs	Foundational: Utility Operations – Operations
BMP 11 - Conservation Pricing	Foundational: Utility Operations – Pricing
BMP 12 - Water Conservation Coordinator	Foundational: Utility Operations – Operations
BMP 13 - Water Waste Prohibition	Foundational: Utility Operations – Operations
BMP 14 - Ultra-Low-Flush Toilet Replacement	Programmatic: Residential

Table 6.2 Demand Management Measures

Demand Management Measure	Implemented	Planned for Implementation	Not Applicable
BMP 1 - Water Survey Programs	✓		
BMP 2 - Residential Plumbing Retrofit	✓		
BMP 3 - Water System Audits	✓		
BMP 4 - Metering with Commodity Rates	✓		
BMP 5 - Landscape Irrigation Programs	✓		
BMP 6 - Washing Machine Rebate Program	✓		
BMP 7 - Public Information Program	✓		
BMP 8 - School Education Program	✓		
BMP 9 - Commercial, Industrial, and Institutional Conservation Programs	✓		
BMP 10 - Wholesale Agency Programs			✓
BMP 11 - Conservation Pricing	✓		
BMP 12 - Water Conservation Coordinator	✓		
BMP 13 - Water Waste Prohibition	✓		
BMP 14 - Ultra-Low-Flush Toilet Replacement	✓		

6.1.1 BMP 1 - Water Survey Programs

This program consists of offering water audits to single-family and multi-family residential customers. Audits include reviewing water usage history with the customer, identifying leaks inside and outside the home, and recommending improvements.

Upon request, City personnel will perform on-site inspection of residences, landscapes, and businesses for potential internal leaks. Leak detection kits are available and are provided to residents free of charge, upon request.

As an incentive to complete the audit, the City provides free low-flow showerheads and kitchen/bathroom faucet aerators.

6.1.2 BMP 2 - Residential Plumbing Retrofit

This program consists of installing physical devices to reduce the amount of water used or to limit the amount of water that can be served to the customer. In accordance with State law, low-flow fixtures have been required on all new construction since 1978. In addition, State legislation enacted in 1990 requires all new buildings after January 1, 1992 to install Ultra-Low-Flush Toilets (ULFT). The City of Corona began their Residential Plumbing Retrofit program in 1998, and markets the program at community events, through an education program, at the department's billing desk, and through brochures.

Several studies suggest that water use savings resulting from miscellaneous interior retrofit fixtures can range between 25 and 65 gpd per housing unit. The studies also suggest that installation of retrofit fixtures in older single-family homes tend to produce more savings, while newer multi-family homes tend to produce fewer savings per housing unit.

Assuming approximately 70 percent current saturation for both single and multi-family accounts, one would estimate current water savings within the City at 1,373 AFY from single family conservation, and 71 AFY from multi-family conservation, yielding a total of 1,444 AFY for BMP 2. If the City were to increase total residential account saturation to 80 percent, further water conservation could be achieved. Retrofitting an additional 3,500 single-family accounts and 180 multi-family accounts would likely decrease use by approximately 205 AFY, or 2 percent of the 9,233 AF reduction in 2020.

6.1.3 BMP 3 - System Water Audits, Leak Detection, and Repair

A water audit is a process of accounting for water use throughout a water system in order to quantify unmetered water usage. Unaccounted-for water is the difference between metered production and metered usage on a system-wide basis.

In past years, the City has contracted a leak detection program out to third party groups. It currently has a contract with Hughes Utility Service Group to conduct a Leak Detection Program. The City's Operations Division determines the areas to be tested, and the Hughes group completes the observations and determines if there is a leak.

Based on water loss calculations for year 2007 through 2009, the water losses (or unmetered water deliveries) within the City's distribution system were estimated at 5 percent. As this is at the low end of the typical water loss spectrum that ranges from 5 to 10 percent, this program does not provide opportunities to substantially decrease the per-capita water use.

6.1.4 BMP 4 - Metering with Commodity Rates for All New Connections and Retrofit of Existing Connections

This BMP requires water meters for all new connections and billing by volume of use, as well as establishment of a program for retrofitting any existing unmetered connections.

All connections within the City are metered and customers are billed according to the amount of water used. As the City continues to install meters at all its new connections, this program will not provide foreseeable water conservation opportunities.

6.1.5 BMP 5 - Large Landscape Conservation Programs and Incentives

This BMP calls for agencies to start assigning reference evapotranspiration (ET_o) based water budgets to accounts with dedicated irrigation meters and to provide water use audits to accounts with mixed use meters.

As a part of its rate structure, the City has placed all dedicated landscape irrigation meters on water budgets. The City also offers water audits to landscape irrigation customers.

Based on the historical billing records of 2010, the City currently serves approximately 650 accounts with dedicated irrigation meters that have a combined annual water demand of 2,609 AFY. This equates to an average water use of 4 AFY per landscape customer. Assuming that these landscape customers could save 25 percent of their water use, or 1 AFY, through more efficient watering techniques and ET_o sensors, the City could potentially save 325 AFY by implementing landscape conservation programs with 50 percent of landscaping customers. This would result in 4 percent of the 9,233-AF reduction needed in 2020.

Although a detailed water conservation analysis would be required to obtain a more accurate water conservation estimate, it can be concluded that this BMP has the potential to contribute significantly towards achieving the City's water conservation goals. Financial incentives, including regional funding from MWDSC, are also available to improve landscape water use efficiency.

6.1.6 BMP 6 - High-Efficiency Washing Machine Rebate Program

This program, in conjunction with MWDSC, provides financial incentives (rebate offers) to qualifying customers who install high-efficiency washing machines in their homes.

These machines typically use 15 to 25 gallons less water per load than typical washers. If the City were to achieve 60-percent saturation of the single-family residential customers, the City would potentially add approximately 15,000 high-efficiency clothes washers (HECWs). At an average of one load per day and 20 gallons of water savings per load, this program could potentially contribute 7,300 gallons per year of water savings per customer. With 60-percent saturation of the single-family sector, this would result in over 335 AFY of conservation, or 4 percent of the 9,233 AF reduction in 2020.

6.1.7 BMP 7 - Public Information Programs

This program consists of distributing information to the public through a variety of methods including brochures, school presentations, newsletters, e-newsletters, and updates to the City's website.

The City actively promotes conservation programs that are offered to single- and multi-family units as well as commercial, industrial, and institutional customers. Additionally, programs are promoted as City sponsored events, in brochures, and landscape classes, and in bill stuffers. WMWD also participates in public information programs.

6.1.8 BMP 8 - School Education Program

This BMP requires water suppliers to implement a school education program that includes providing educational materials and instructional assistance.

The City typically reaches over 4,000 students each year through their education program.

6.1.9 BMP 9 - Conservation Programs for Commercial, Industrial, and Institutional Accounts

The City is planning to continue to implement additional CII programs in the future. Such programs typically involve turf fields, smart irrigation timers, and industrial process water use reductions. Currently, the City has approximately 4,000 CII accounts. Assuming that the City has the potential to reach 300 new CII customers by year 2020, and that each customer would, on average, save 2 AFY per program, the total savings of the CII program would generate approximately 600 AFY of water conservation, which is about 6.5 percent of the 9,233 AFY water conservation goal for year 2020.

6.1.10 BMP 10 - Wholesale Agency Programs

This BMP applies to wholesale agencies and defines a wholesaler's role in terms of financial, technical, and programmatic assistance to its retail agencies implementing BMPs.

The City is not a wholesale agency, so this BMP does not apply.

6.1.11 BMP 11 - Conservation Pricing

The City adopted a budget-based, tiered water rate system in April of 2010 which charges users based on the volume of water consumed with rates per unit increasing after the budget is exceeded. The rate structure, summarized in Table 6.3, Table 6.4, and Table 6.5 below with March 2011 rates, differs between residential, commercial, industrial, institutional and government rates, and reclaimed water rates. These sector based rates are in addition to a flat readiness to serve charge which is based on service pipe diameter.

Table 6.3 Residential Tiered Rate Structure

Tier	Rate per Unit	Basis for Tier
Indoor Budget	$1.85	Efficient indoor water use
Outdoor Budget	$2.04	Efficient outdoor water use
Inefficient Use	$2.78	1% to 20% over water budget
Excessive Use	$5.56	21% to 40% over water budget
Wasteful Use	$10.19	More than 40% over water budget

Notes:
1. Applies to Residential Customers only.
2. Rates effective March 1, 2011. Further information available on Corona website.

Table 6.4 Commercial, Industrial, Institutional & Government Rate Structure

Tier	Rate per Unit	Basis for Tier
Water Budget	$2.04	Efficient water use
Inefficient Use	$2.78	1% to 20% over water budget
Excessive Use	$5.56	21% to 40% over water budget
Wasteful Use	$10.19	More than 40% over water budget

Notes:
1. Outdoor budget for dedicated meters; applies to CII and Government Customers only.
2. Rates effective March 1, 2011. Further information available on Corona website.

Table 6.5 Reclaimed Rate Structure

Tier	Rate per Unit	Basis for Tier
Water Budget	$1.39	Efficient indoor water use
Inefficient Use	$2.08	1% to 20% over water budget
Excessive Use	$2.78	21% to 40% over water budget
Wasteful Use	$4.16	More than 40% over water budget

Notes:
1. Applies to Reclaimed Customers only.
2. Rates effective March 1, 2011. Further information available on Corona website.

The residential indoor budget is meant to account for the water a person will use indoors. It is based on assumptions involving how much water an average person will use indoors during a typical day. The City assumes an average of 60 gallons per person per day, an average of four people per home, and bills based on the number of days in the billing cycle. This quantity of water, 7,200 gallons or 10 units (where a unit is 100 cubic feet), is the residential indoor water budget. As shown in Table 6.3, using water in excess of this budget results in an increased cost per unit of water as soon as the budget is exceeded.

The residential outdoor budget is intended to account for the water a person will use outdoors. It is calculated by taking into account landscaped area, evapotranspiration, and irrigation efficiency. The landscaped area is estimated based on GIS analysis of data from the county assessor. (By assuming averages for each of these variables, a 5,000 square foot lot for example, the City calculates an outdoor residential use of 36 units. Again, using water in excess of these budget results in an increased cost per unit.)

The water use for commercial, industrial, institutional, and government users applies to water use among these user types. The water budget is calculated by taking an average of the last three years of water use. Each year, this average is recalculated to determine the new water budget for structure accounts, while the budget for dedicated irrigation accounts remains the same.

Reclaimed use applies to reclaimed water users, and rates for reclaimed water usage are lower in price than the rates for potable usage. However, the same rate structure still applies. The reclaimed water rate is structured this way in order to incentivize its use as an alternative to potable water. As shown in Table 6.3, Table 6.4, and Table 6.5, the City clearly incentivizes the use of reclaimed water while discouraging going past one's designated water budget.

6.1.12 BMP 12 - Water Conservation Coordinator

The City of Corona currently has two Conservation Coordinators who are responsible for coordinating and expanding the City's water conservation program and providing residents with useful water conservation information.

6.1.13 BMP 13 - Water Waste Prohibition

Water waste is also addressed in the City's water shortage contingency plan outlined in Chapter 13.26 of the Corona Municipal Code and amended in Ordinance 2962 (see Appendix F).

Violation of any of the City's water conservation provisions is a misdemeanor subject to imprisonment in the county jail for not more than thirty days or a fine not to exceed $1,000, or both. These prohibitions are further discussed in Chapter 8.

6.1.14 BMP 14 - Residential Ultra-Low-Flush Toilet Replacement Programs

State legislation requires the installation of efficient plumbing in new construction and, effective in 1994, requires that only ultra low-flush toilets (ULFTs) be sold in California.

The City, through MWDSC, provides a rebate of $50 on high efficiency toilets.

Over time, this program, combined with the natural replacement of toilets with ULFTs, could increase the City's water savings substantially. Upon reaching a theoretical residential market saturation of 50 percent, the City would save approximately 245 AFY which is about 3 percent of the 9,233 AFY water conservation goal for year 2020.

6.2 WATER CONSERVATION IMPLEMENTATION PLAN

The BMP's currently implemented by the City have been effective in reducing water consumption, but further efforts will need to be made to reach the 2020 water conservation target. The City's historic per capita and future projections are shown on Figure 6.1.

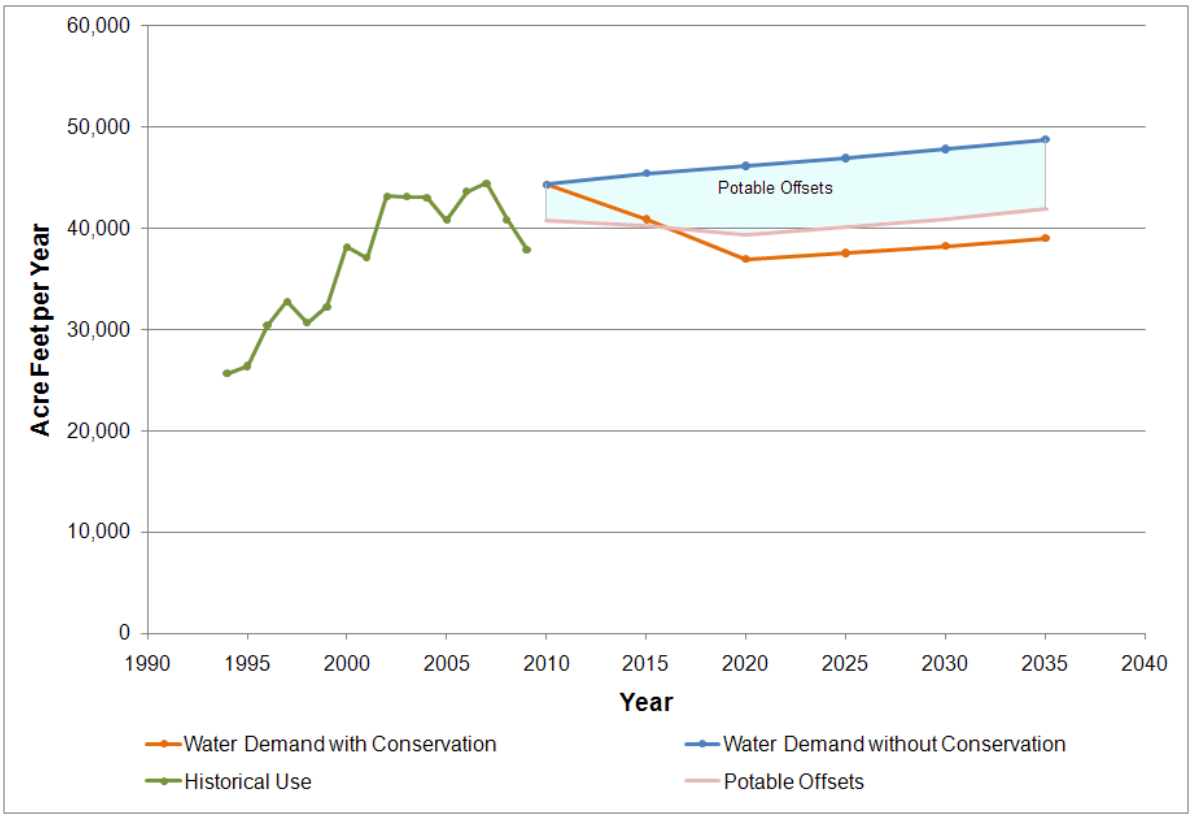

Figure 6.1 Projected Water Demands with and without Conservation

The conservation and non-conservation projections diverge rapidly after 2010, revealing the conservation that the City will need to achieve by year 2020. The potential effect of current BMP programs by 2020 is shown on Figure 6.1. This value is listed as potential because it is based on the assumption that currently implemented BMPs will continue to be practiced and will have an effect on the City's water consumption. A breakdown of the potential water conservation amounts by BMP as described in the previous sections is graphically presented on Figure 6.2.

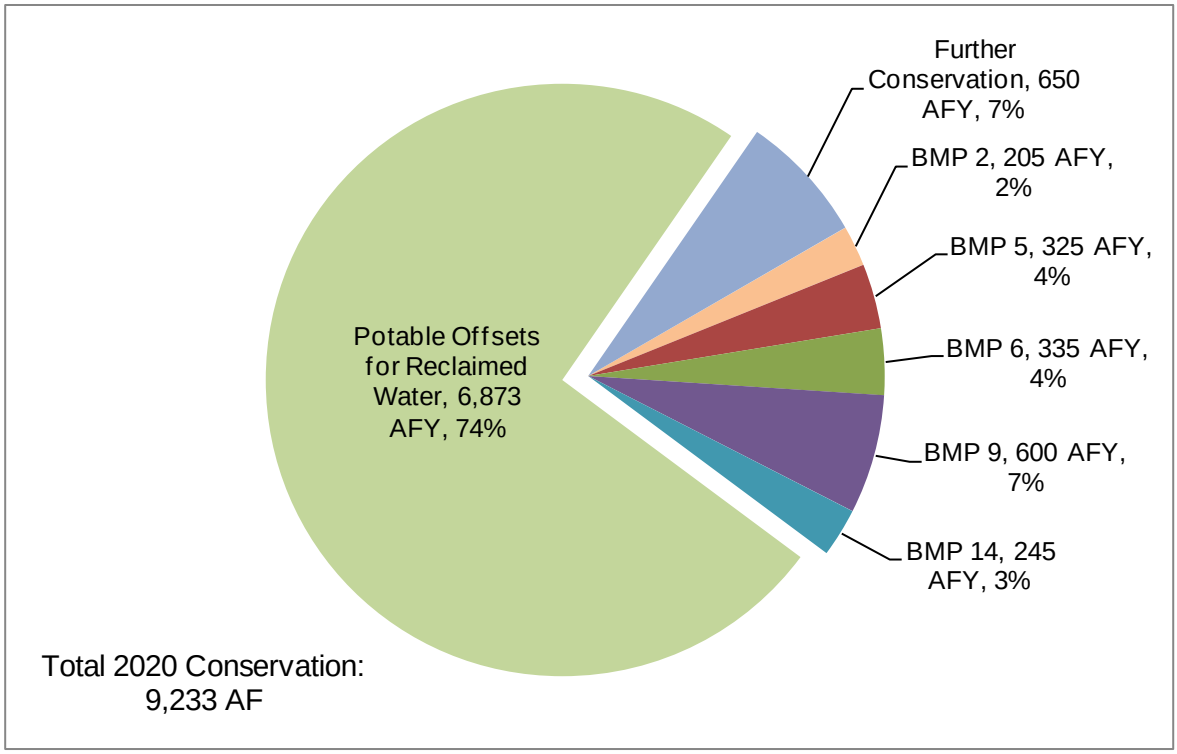

Figure 6.2 Water Conservation Methods

As shown on Figure 6.2, the current BMP programs will only account for 1,710 AF of the 9,233 AFY of conservation needed to reach the 36,934 AF target in 2020, which equates to about 19 percent of the total water conservation goal. This figure, however, only accounts for 5 of the 13 BMPs (discounting BMP 10) which the City can use to reduce water consumption. BMP's such as school education, water surveying and other such methods remain viable strategies to reduce consumption as well.

The increased use of reclaimed water will also be instrumental in the City's conservation efforts. The 6,873 AF of reclaimed water projected to be used in 2020 will reduce potable water use and account for approximately 74 percent what the City will need to conserve.

In addition, the City will continue to target waste through the City's tiered rate and water budget system, in particular providing programs to customers to encourage water savings outdoors. In addition to efforts documented with the BMPs, the City has received grants in the past to install weather-based irrigation timers and currently offers rebates for residential and commercial turf removal projects. It is anticipated the City will continue these efforts.

To achieve the necessary amount of further water conservation, the City should prioritize its efforts towards expanding its large scale BMP programs to result in large conservation gains. Continued support of residential retrofits is also essential because of the City's largely residential customer base. Finally, although some BMPs do not result in as tangible of conservation savings, school and public education programs will provide much needed support as the City strives to meet its 2020 conservation target.

WATER RELIABILITY PLANNING

The UWMPA requires that the UWMP address the reliability of the agency's water supplies. This includes supplies that are vulnerable to seasonal or climatic variations. In addition, an analysis must be included to address supply availability in a single dry year and in multiple dry years.

> *10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:*
>
> *10631 (c) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable.*
>
> *10631 (c) For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to replace that source with alternative sources or water demand management measures, to the extent practicable.*
>
> *10631 (c) Provide data for each of the following: (1) An average water year, (2)*
>
> *A single dry water year, (3) Multiple dry water years.*
>
> *10632. The plan shall provide an urban water shortage contingency analysis which includes each of the following elements which are within the authority of the urban water supplier:*
>
> *10632 (b) An estimate of the minimum water supply available during each of the next 3-water years based on the driest 3-year historic sequence for the agency's water supply.*

The UWMPA also requires that the UWMP include information on the quality of water supplies and how this affects management strategies and supply reliability.

> *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 5-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects management strategies and supply reliability.*

Finally, the UWMPA lays out an approximate methodology for how suppliers should make the dry year supply and demand comparisons, and what information needs to be presented.

> *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 total projected water use over the next 20 years, in 5-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from the state, regional, or local agency population projections within the service area of the urban water supplier.*

7.1 OVERVIEW OF WATER SUPPLY RELIABILITY

The City faces many of the same water supply issues as other water purveyors in Southern California. Drought, climatic challenges, water conveyance, environmental regulation, and competition for water from outside the region all force changes in water deliveries and the timing of those deliveries.

As discussed in Chapter 3, the City's water supply consists primarily of three sources: imported water, groundwater, and reclaimed water. In 2009, the City received approximately 52 percent of its total water from local groundwater sources, 31 percent from the Colorado River and 9 percent from the SWP, and 8 percent from reclaimed water. The following sections outline and summarize the supply reliability of these three sources. Reliability is described first in a general, conceptual sense, then projected demands for the three sources are compared against supply projections, to numerically estimate and determine the City's total supply reliability.

7.1.1 Imported Water Supply Reliability

Although the City purchases its water from WMWD, the water is ultimately imported to the region by MWDSC. For this reason, when examining imported water supply reliability it is most important to consider the reliability estimates given by MWDSC. Moreover, at the time of the writing of this report, MWDSC offers the most comprehensive and up-to-date estimates of imported water supply reliability.

Because of competing needs and uses associated with these water resources, MWDSC has undertaken a number of planning efforts during the past 15 years. Some of the most recent documents include the 2010 Integrated Water Resources Plan update, the Water Surplus and Drought Management Plan, the Water Supply Allocation Plan, and the Long-term Conservation Plan. These documents were reviewed for the purpose of preparing the City's 2010 UWMP.

MWDSC's customers receive water from three different sources. The first is from the customer's own local resources (such as ground or surface water) while the remaining is imported from two sources: the Colorado River (via the CRA), and the Sacramento-San Joaquin River Delta via the SWP. The City receives water from both the Colorado River and the SWP.

7.1.2 Groundwater Supply Reliability

Groundwater supplies are considered a reliable supply source since they are not significantly impacted by short term droughts. However, the basin must be replenished in years with excess rainfall in order to maintain the supply in drought years. Hence, in extended droughts, levels within the groundwater basin may fall as the basin is not replenished through natural inflows.

As discussed in Chapter 3 and the 2008 GWMP, the City's supply target is to obtain approximately 50 percent of its potable water supply from groundwater. The City has made efforts in the past to decrease its reliance on imported water by additional pumping and development of its groundwater resources.

7.1.3 Reclaimed Water Supply Reliability

As discussed in Chapter 4, the City owns and operates three WRFs, for a total capacity of 15 mgd. Treated effluent which is not used for landscaping or dual plumbing is discharged to Temescal Creek or to percolation ponds. Reclaimed water is generally considered to be a reliable water supply since the WRFs provide effluent regardless of climatic conditions. It is not likely that drought conditions would have a significant effect on the City's ability to utilize reclaimed water.

7.2 FUTURE SUPPLY PROJECTS AND PROGRAMS

The three agencies who bear primary responsibility for providing water supplies to the City are MWDSC, WMWD, and the City itself. This section outlines the future supply projects and programs planned by these three agencies.

7.2.1 Projects Planned by MWDSC

As described in its Regional UWMP, MWDSC plans to meet its supply reliability goal through the following programs:

- Surface water storage programs related to the SWP and Colorado River.
- Colorado River water management programs.
- SWP management programs.
- Central Valley/SWP storage and transfer programs.
- Water conservation.
- Development of local supplies (such as the desalter).
- Water reclamation projects.
- Ocean desalination programs.
- Groundwater banking programs in Southern California region (Riverside - Corona Feeder).

The implementation approach and the achievements to-date for each of these programs are discussed in detail in Chapter 3 of MWDSC's Regional UWMP. The projected increase in supply availability due to these programs under average year conditions is summarized in Table 7.1.

Table 7.1 MWDSC's Current and Planned Supply Programs

Program Description	2015 (AFY)	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)
Current Programs					
In-Region Storage and Programs	685,000	931,000	1,076,000	964,000	830,000
California Aqueduct	1,550,000	1,629,000	1,763,000	1,733,000	1,734,000
Colorado River Aqueduct	1,250,000	1,250,000	1,250,000	1,250,000	1,250,000
Capability of Current Programs	**3,485,000**	**3,810,000**	**4,089,000**	**3,947,000**	**3,814,000**
Under Development					
In-Region Storage and Programs	206,000	306,000	336,000	336,000	336,000
California Aqueduct	382,000	383,000	715,000	715,000	715,000
Colorado River Aqueduct	187,000	187,000	187,000	182,000	182,000
Capability of Planned Programs	**588,000**	**689,000**	**1,051,000**	**1,051,000**	**1,051,000**
Supply Increase					
Total (AFY)	**4,073,000**	**4,499,000**	**5,140,000**	**4,998,000**	**4,865,000**
Total (%)	**+17%**	**+18%**	**+26%**	**+27%**	**+28%**

Notes:
1. Source: Table 2-11 from MWDSC RUWMP (MWDSC, 2010).

7.2.2 Projects Planned by WMWD

At this time, WMWD has outlined plans for over 90 projects which range in scale from regional to local, but all of which provide some benefit to the City. These projects fall primarily into the following categories:

- Conveyance.
- Conjunctive Management and Groundwater Storage.
- Reclaimed Municipal Water.
- Flood Control.
- Groundwater and Aquifer Remediation.
- Matching Water Quality to Use.
- Pollution Prevention.
- Recharge Area Protection.
- Urban Runoff Management.

A more complete list and outline of future projects can be found in WMWD's Integrated Regional Water Management Plans and 2010 UWMP.

7.2.3 Projects Planned by the City of Corona

The following projects have been planned to enhance the operations and reliability of the City's water infrastructure:

- New Water Wells.
- Replacement Water Wells.
- Rincon Groundwater Treatment Project.
- Wellhead Treatment for Wells 7 and 17.
- El Sobrante Groundwater Treatment Project.
- Groundwater Blending Program.
- Improvement of Groundwater Quality/Quantity Monitoring Program.
- Coldwater Subbasin Enhanced Recharge Program.
- Recharge Basins within Oak Avenue Detention Basin.
- Recharge Basins within Main Street Detention Basin.
- Upgradient Injection Wells.
- Reclaimed Water Injection Wells.
- Reclaimed Water Zone 3 to Zone 2 Interconnect.
- Lincoln and Cota Street Percolation Ponds Maintenance Program.
- Lee Lake Water District's Discharge to Bedford Subbasin.
- WWTP 2 and 1A Upgrade to Tertiary.

Implementation of the identified projects will allow the City to maintain and expand its water supply and distribution infrastructure, increasing supply reliability and reliability of its water and reclaimed water distribution systems.

7.3 FACTORS RESULTING IN INCONSISTENCY OF SUPPLY

There are a variety of factors that can impact water supply reliability. Factors impacting the City's supply sources are indicated with a "●" in Table 7.2. A brief discussion on each of these factors is provided below.

Table 7.2 Factors Resulting in Inconsistency of Supply

Water Supply Sources	Specific Source Name	Limitation Quantification	Legal	Environmental	Water Quality	Climatic	Additional Information
Imported	Wholesaler	-	●	●	-	●	-
Groundwater	Temescal Basin	-	-	-	●	-	-
Groundwater	Coldwater Subbasin	-	●	-	-	-	-
Reclaimed Water	Reclaimed	-	-	-	-	-	-

7.3.1 Legal

Although WMWD is the City's direct wholesaler, imported supply reliability for the entire region ultimately lies with MWDSC. MWDSC's primary purpose is to provide a supplemental supply of water for domestic and municipal uses at wholesale rates to its member public agencies. MWDSC's principal sources of water are the SWP and the Colorado River. The Colorado River was MWDSC's original source of water after the organization's establishment in 1928 and MWDSC has a legal entitlement to receive water from the Colorado River under a permanent service. MWDSC also imports significant amounts of water from the SWP, which is owned and operated by the California Department of Water Resources (DWR). In 1960, MWDSC signed a contract with DWR. MWDSC is one of 29 agencies that have long-term contracts for water service from DWR, and is the largest agency in terms of the number of people it serves (19.1 million), the share of SWP water that it has contracted to receive (approximately 46 percent), and the percentage of total annual payments made to DWR by agencies with contracts (approximately 60 percent in 2008). The longevity and importance of these legal arrangements with MWDSC's largest suppliers indicate that, while water importation is frequently litigious, MWDSC has shown a continuous ability to procure water from these supplies, and will continue to do so in the future.

The issue of legality also affects the City's ability to draw water from the Coldwater Subbasin. While not affected by the water quality issues of the Temescal Basin, the Coldwater Subbasin has small volume and has faced recharge issues in the past, necessitating a regional agreement as to the subbasin's usage, included in Appendix D. Most of the production has been by the City and EVMWD, the only municipal pumpers in the subbasin. The City acquired the rights to the surface flows of Coldwater Canyon in 1964 when it purchased the assets of the CCWC. To meet DPH requirements, the surface flow is now spread in percolation ponds and extracted by the City's three Glen Ivy area wells in the Coldwater Subbasin. 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. In addition, the agreement allows the additional pumping of return flows by the City from the previous fiscal year.

7.3.2 Environmental

Given the fragile state of many of California's ecosystems, environmental concerns inevitably arise during the water planning process. The delicacy of these systems can, in turn, cause a lack of supply due to the enforcement of environmental legislation. The recent legal actions involving the Endangered Species Act in the Delta are an example of the clash between environmental concerns and water supply. Once again, the environmental issues which impact supply reliability for the City are primarily dealt with by MWDSC. In June 2007, MWDSC's Board approved a Delta Action Plan that provides a framework for staff to pursue actions with other agencies and stakeholders to build a sustainable Delta and reduce conflicts between water supply conveyance and the environment. MWDSC continues to develop principles to help achieve its mission to provide adequate and reliable supplies of high-quality water in an environmentally and economically responsible way.

7.3.3 Water Quality

Elevated nitrate concentrations have been documented in the Temescal Subbasin since at least the 1950s. Water quality data indicate nitrate concentrations ranging from 0.3 to 124 mg/L. This requires the use of the Temescal Desalter for the City to utilize groundwater from Temescal Basin. More on how water quality issues affect supply can be found in Section 7.8.

7.3.4 Climatic

MWDSC's service area encompasses three major climate zones, while MWDSC's water sources are drawn from an immense area. The Colorado River watershed is over 246,000 square miles while the SWP draws from about 32,000 square miles. Due to these geographic considerations, climate change will add many new uncertainties to the challenges of planning, and irrespective of the debate associated with the sources and cause of increasing concentrations of greenhouse gasses, changes in weather will significantly affect water supply planning. MWDSC intends to explore opportunities to continually increase efficiency, join the California Climate Action Registry, support environmental practices, develop solar power at some of their WTFs, and pursue renewable water and energy programs that promote sustainability. Given that climatic pressures will unarguably affect supply reliability, continual attention to this issue will be necessary on the part of MWDSC.

7.4 SUPPLY RELIABILITY

There are two aspects of supply reliability that can be considered. The first relates to immediate service needs and is primarily a function of the availability and adequacy of the

supply facilities. The second aspect is climate-related, and involves the availability of water during mild or severe drought periods. This section compares water supplies and demands during three water scenarios: normal water year, single dry water year, and multiple dry water years. These scenarios are defined as follows.

- **Normal Year**:
  The normal year is a year in the historical sequence that most closely represents median runoff levels and patterns. The supply quantities for this condition are derived from historical average yields.
- **Single Dry Year**:
  This is defined as the year with the minimum useable supply. The supply quantities for this condition are derived from the minimum historical annual yield.
- **Multiple Dry Years**:
  This is defined as the three consecutive years with the minimum useable supply. Water systems are more vulnerable to these droughts of long duration, because they deplete water storage reserves in local and state reservoirs and in groundwater basins. The supply quantities for this condition are derived from the minimum historical three consecutive years' annual average yields.

In the last few years, the City's potable water supply has shifted to be relatively evenly divided between water imported from WMWD and local groundwater. In identifying historic supply reliability conditions throughout dry year and multiple dry year events, the chosen years are consistent with the years in MWDSC's 2010 RUWMP. As summarized in Table 7.3, MWDSC has identified 1977 as the single driest year since 1922 and the years 1990 through 1992 as the driest multiple years over that same period. These years represent the years in which the least amount of imported water was available from MWDSC.

Table 7.3 Basis of Water Year Data

Water Year Type	Base Year(s)
Average Water Year	1993
Single Dry Water Year	1977
Multiple Dry Water Years	1990 - 1992

Sources:
Regional UWMP[1] for single and multi dry years, and historical consumption and population data provided by City for average year.

The regional UWMP does not identify a particular year that would represent average demand conditions. To determine the average demand year, the City's historical per capita water usage was evaluated. By normalizing water consumption with population and thus expressing consumption in gpcd, the increase in demands due to growth is eliminated. The

[1] MWDSC, 2010

historical per capita consumption during the 1989 through 2010 period is shown on Figure 7.1. As shown, the average consumption in the period was 261 gpcd. As the per capita consumption in 1993 was 262 gpcd and the closest to the 21-year average of 261 gpcd, this year was selected to represent average year conditions.

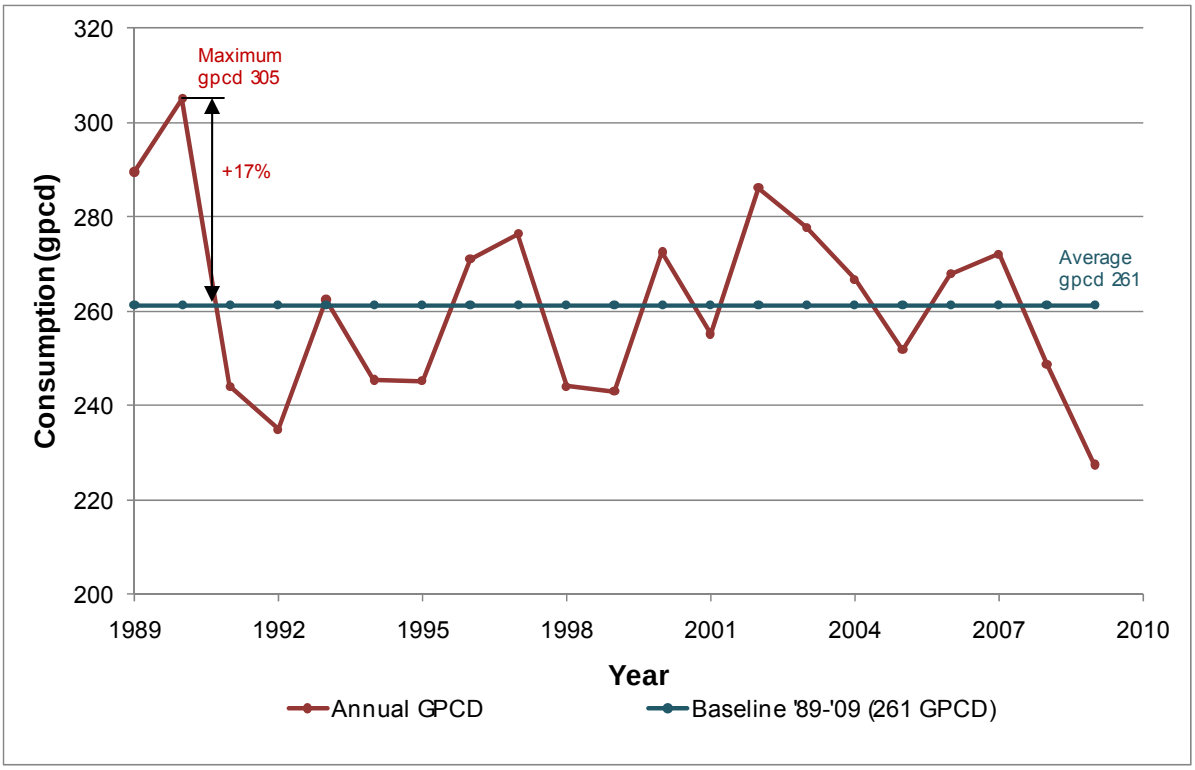

Figure 7.1 Historical Per-Capita Consumption Variation

Supply reliability for these historical conditions is presented in Table 7.4. The total amount of imported water in MWDSC's drought years is less than during average year conditions. The total demand in 1992 (third dry year) is only approximately 85 percent of the average year 1993.

Table 7.4 Supply Reliability – Historical Conditions

Water Supply Source	Average Year (1993)	Single Dry Year (1977)	Multiple Dry Years		
			1990	1991	1992
Imported (AFY)	12,798	3,255	17,501	15,541	13,903
% of Normal	100%	25%	137%	121%	109%
Groundwater (AFY)	13,951	7,889	8,451	6,587	8,957
% of Normal	100%	57%	61%	47%	64%
Reclaimed	N/A	N/A	N/A	N/A	N/A
% of Normal	N/A	N/A	N/A	N/A	N/A
Total (AFY)	**26,749**	**11,144**	**25,953**	**22,128**	**22,860**
% of Normal	**100%**	**42%**	**97%**	**83%**	**85%**

Notes:
Source: Historical production records provided by City

Due to this decrease in demand in this 3-year period, it was considered not realistic to use this period as the basis for future multiple dry year planning. Instead, the year with the maximum per-capita usage was selected to project future demands during single and multiple dry years. This provided a more conservative approach to drought planning. As shown on Figure 7.1, the maximum per-capita use in the 21-year period was 305 gpcd, which is 17 percent higher than the average consumption of 261 gpcd.

This method differs from the single and multiple dry year demand projections presented in MWDSC's 2010 Regional UWMP, but provides a more conservative planning basis.

7.4.1 Demand Variations

The demand projections shown in Table 7.5 were obtained from the MWD-MAIN Water Use Forecasting System (MWD-Main), which is based on forecasts taken from the SCAG 2007 Regional Transportation Plan and the SANDAG Series 12: 2050 Regional Growth Forecast.

Table 7.5 MWDSC Retail Demands for Average, Single, and Multiple Dry Years

Retail Municipal and Industrial Demand	2015 (AFY)	2020 (AFY)	2025 (AFY)	2030 (AFY)	2035 (AFY)
Average Year (AFY)	4,978,000	5,170,000	5,330,000	5,491,000	5,627,000
Single Dry Year (AFY)	5,000,000	5,194,000	5,354,000	5,515,000	5,653,000
Multiple Dry Year (AFY)	5,004,000	5,232,000	5,409,000	5,572,000	5,715,000
Single Dry Year Increase(1)	0.4%	0.5%	0.5%	0.4%	0.5%
Multiple Dry Year Increase(1)	0.5%	1.2%	1.5%	1.5%	1.6%

Notes:
1. As percentage of Average Year Conditions.
Source: Tables 2-6, 2-7, and 2-8 of Regional UWMP[2].

As shown in Table 7.5, the MWDSC's RUWMP shows that the single and multiple dry year retail municipal and industrial demands only increased between 0.4 and 1.6 percent. This is a very low estimate of demand increases, which typically involve a projected increase of at least 5 percent. Demand variations due to dry year conditions are anticipated to be less noticeable in the much larger service area of MWDSC than in the City's service area because:

- MWDSC's customers may experience different levels of extreme dry weather within different portions of its large service area,
- MWDSC's service area includes many urban regions with very limited outdoor demands, making those areas less sensitive to weather variations, and
- MWDSC's service area includes more industrial and other non-residential demands that are not sensitive to weather.

In other words, the City's demands are expected to increase more during hydrological dry years than MWDSC's demand as the entire area would experience extreme dry weather conditions at the same time and because the primarily residential character with plentiful outdoor usage makes demands more weather dependent. Therefore, it was decided to use the City's historical demands normalized for population (per-capita consumption), as shown on Figure 7.1, as a basis for projecting the demand increase during single and multiple dry years. This means that 1990 was chosen as the base year for both single and multiple dry year projections and that the average demands for these years were increased by 17 percent.

[2] MWDSC, 2010

7.5 SUPPLY AND DEMAND COMPARISON

The UWMPA requires that the UWMP demonstrate that sufficient water supplies be available to meet the next 25 years of projected water demands.

7.5.1 Average Year

The projected average year demands and supplies compared in 5-year increments are presented in Table 7.6 through Table 7.16. This comparison consists of a number of steps described below.

Table 7.6 City of Corona Projected Average Year Water Demands

Description	2015	2020	2025	2030	2035
Projected Average Year Demand (AFY)	40,888	36,934	37,551	38,250	39,005
Increase Compared to 2010[(1)] (AFY)	(3,443)	(7,397)	(6,781)	(6,082)	(5,326)
Increase Compared to 2010	-8%	-17%	-15%	-14%	-12%
Demand as % of 2010 Demand	92%	83%	85%	86%	88%

Notes:
Based on a 2010 Average Year Demand of 44,331 AFY.

First, the projected average year demands for 2015 through 2020 were compared with the year 2010 demands. As shown, the projected demands for the entire planning period are projected to remain below the year 2010 demand. This decrease reflects the SBX7-7 water conservation targets combined with limited growth potential within the City. This trend is discussed in more detail later.

Secondly, the average year supplies from MWDSC for 2015 through 2020 are compared with the year 2010 supplies. This comparison only includes the current supply programs operated by MWDSC, such as the existing in-region storage programs, the SWP via the California Aqueduct, and the Colorado River Aqueduct. For conservative planning purposes, the capacities of the new programs that are under development are not included in the summary presented in Table 7.7. It should be noted that the average year supply for 2010 was obtained from the 2005 Regional UWMP as this information was not presented in the 2010 Plan. As shown, there has been a significant increase in the estimated supply capacity between year 2010 (2.7 million acre feet (maf)) and 2015 (3.5 maf).

Table 7.7 MWDSC Projected Average Year Supplies

Description	2015	2020	2025	2030	2035
Average Year Supply(1) (AFY)	3,485,000	3,810,000	4,089,000	3,947,000	3,814,000
Increase Compared to 2010(2) (AFY)	817,000	1,142,000	1,421,000	1,279,000	1,146,000
Increase Compared to 2010	31%	43%	53%	48%	43%
Supply as % of 2010 Supply	131%	143%	153%	148%	143%

Notes:
1. Based on current supply programs as listed in Table 2-11 from 2010 Regional UWMP.
2. Based on projected supply capacity of 2,668,000 AFY obtained from 2005 Regional UWMP.

Subsequently, projected MWDSC supplies and demands were compared under average year conditions. As shown in Table 7.8, the projected supplies are substantially greater (174 to 181 percent) than the projected demands through the planning horizon of 2035. This reflects a combination of increased water conservation efforts by the member agencies as well as an increase in supplies.

Table 7.8 MWDSC Projected Average Year Supply as Percentage of Demand

Description	2015	2020	2025	2030	2035
Average Year Supply(1) (AFY)	3,485,000	3,810,000	4,089,000	3,947,000	3,814,000
Average Year Demand(2) (AFY)	2,006,000	1,933,000	1,985,000	2,049,000	2,106,000
MWDSC Supply as % of Demand	174%	197%	206%	193%	181%

Notes:
1. Based on current supply programs as listed in Table 2-11 from 2005 Regional UWMP.
2. Based on total demands on Metropolitan as listed in Table 2-11 from 2010 Regional UWMP.

The last step to determine imported water supply and demand involves the comparison of the relative increase in the City's demand with the relative increase in MWDSC supplies. This comparison is presented in Table 7.9. As shown, the imported water supplies are projected to increase substantially more (81 to 121 percent) than the City's demands. This difference indicates that it is reasonable to expect that MWDSC would have sufficient supplies available to accommodate the City's projected demands under average year conditions as WMWD would get its proportional share of the increased supplies as one of MWDSC's 26 member agencies.

Table 7.9	Comparison of Supply and Demands Under a Normal Year					
Row	**Description**	**2015**	**2020**	**2025**	**2030**	**2035**
1	City of Corona Demand Increase as % of 2010 Demand (from Table 7.6)	92%	83%	85%	86%	88%
2	MWDSC Supply Increase as % of 2010 Supply (from Table 7.7)	131%	143%	153%	148%	143%
3	MWDSC Supply as % of Demand (from Table 7.8)	174%	197%	206%	193%	181%
4	**Difference MWD Supply Increase and City of Corona Demand Increase (Row 3 – Row 1)**	**81%**	**114%**	**121%**	**106%**	**93%**

Groundwater supply and demand projections are based on a few simpler assumptions. For future supply projections, the groundwater supply was assumed to be equal to currently existing well capacity. The assumption is made that pumping beyond the recommended levels in the 2008 GWMP will be made possible through groundwater recharge. Groundwater demand projections are determined by taking the total demand for the City and assuming that 50 percent will be satisfied with local groundwater. This production goal is based on the 2008 GWMP[3].

Although the amount of groundwater stored within the groundwater basins will decrease during single or multiple dry year events due to lack of recharge, the 2008 GWMP does not plan for reduced groundwater supplies for the City's groundwater basins. As such, groundwater supply is assumed to remain constant over the projected timeframe.

The ratios presented in Table 7.9 were used to project the imported water supply availability for each planning year. By combining the imported water supplies with the other supply sources, the total available supply capacity is calculated. The available supplies were then compared with projected demands to determine if the City has sufficient water supplies available to meet future demand under average year conditions. This summary is presented in Table 7.10. While reclaimed water cannot be used to meet potable demands, it has been included in the supply reliability models in order to examine the City's total supply mix.

As discussed above, the imported water supplies shown in Table 7.10 are based on the amount of supply MWDSC has available as a percentage of normal year demands. While hydraulic capacity of the imported water connections and treatment capacity may exceed the imported water supply shown, it is anticipated that MWDSC's available supply of imported water will be the limiting factor in the City's imported water supply.

[3] GWMP, 2008

The reclaimed water supply shown in Table 7.10 is based on the treatment capacity of the City's WRFs. It is anticipated that the treatment capacity of the WRFs will be the limiting factor in the quantity of reclaimed water supply available.

Table 7.10 Supply and Demand Comparison – Normal Year

Water Sources	2015	2020	2025	2030	2035
Supply					
Projected Supply as a % of Demand During a Normal Year(1)	174%	197%	206%	193%	181%
Imported Water Supply(2)	35,517	36,399	38,676	36,840	35,320
Groundwater Supply	24,921	24,921	24,921	24,921	24,921
Reclaimed Water Supply(4)	11,201	14,952	14,952	14,952	14,952
Total Supply	71,640	76,272	78,549	76,713	75,192
% of Normal Year	100%	100%	100%	100%	100%
Demands					
Imported Water (AFY)	20,444	18,467	18,775	19,125	19,503
Groundwater(3) (AFY)	20,444	18,467	18,775	19,125	19,503
Reclaimed Water(6) (AFY)	5,222	6,873	6,873	6,873	6,873
Total Demand (AFY)	46,110	43,807	44,424	45,123	45,878
% of Year 2010(5) (AFY)	104%	99%	100%	102%	103%
Difference Supply - Demand	25,529	32,465	34,125	31,591	29,314
Difference as % of Supply	36%	43%	43%	41%	39%
Difference as % of Demand	55%	74%	77%	70%	64%

Notes:
1. From Table 7.8.
2. Calculated by multiplying the imported water demand with the imported water supply (%) from Row 1.
3. Groundwater demands are established at 50% of total potable demands.
4. Reclaimed water supply for 2015 is determined by tertiary treatment capacity in 2010; a portion of available wastewater flows were used for year 2020 and thereafter.
5. Year 2010 deliveries were 44,331 AFY.
6. Reclaimed water demands are not projected to offset potable demands in conservation projections since water conservation projections are targets that are independent of any potable water demand projections which would be subject to further offsets.

As shown in Table 7.10, it is projected that the City has sufficient supplies available to meet both potable and reclaimed water demands through 2035 under average year conditions with a supply surplus ranging from 55 to 77 percent of the projected demands. Although the reclaimed water supply of 14,952 AFY cannot be used to meet potable demands, removing the 8,000 AFY difference between reclaimed water supply and demand does not affect the conclusion that sufficient supplies are available to meet potable demands.

7.5.2 Single Dry Year

As described in the previous section, the projected average year potable and reclaimed water demands were increased by 17 percent to estimate water demands during dry years. The projected imported water supplies were obtained from MWDSC's Regional 2010 UWMP. The projected single dry year demands and supplies compared in 5-year increments are presented in Table 7.11 and Table 7.12. Details on the calculations of the values presented in this table are included in Appendix H.

Table 7.11 Comparison of Supply and Demands under a Single Dry Year

Row	Description	2015	2020	2025	2030	2035
1	City of Corona Demand Increase as % of 2010 Demand	108%	97%	99%	101%	103%
2	MWDSC Supply Increase as % of 2010 Supply	86%	98%	105%	99%	95%
3	MWDSC Supply as % of Demand	113%	129%	135%	125%	116%
4	**Difference MWD Supply Increase and City of Corona Demand Increase (Row 3 – Row 1)**	**6%**	**31%**	**36%**	**25%**	**13%**

Notes:
Details on the calculations in each row are included in Appendix H.

Similar to the normal year, the imported water supplies shown in Table 7.12 are based on the amount of supply MWDSC anticipates having available in a single dry year as a percentage of normal year demands. While hydraulic capacity of the imported water connections and treatment capacity may exceed the imported water supply shown, it is anticipated that MWDSC's available supply of imported water will be the limiting factor in the City's imported water supply.

Similar to the normal year, the reclaimed water supply shown in Table 7.12 is based on the treatment capacity of the City's WRFs. It is anticipated that the treatment capacity of the WRFs will be the limiting factor in the quantity of reclaimed water supply available and that the single year drought will have a limited impact on the quantity of wastewater available for use in the reclaimed water system.

Note that the reclaimed water demands are anticipated to increase in a single dry year similar to potable water demands. It is expected that the decreased rainfall associated with a single dry year will require additional irrigation demands.

Table 7.12 Supply and Demand Comparison – Single Dry Year

Water Sources	2015	2020	2025	2030	2035
Supply					
Projected Supply as a % of Demand During a Single Dry Year(1)	113%	129%	135%	125%	116%
Imported Water Supply(2)	27,009	27,739	29,644	27,961	26,408
Groundwater Supply(3)	24,921	24,921	24,921	24,921	24,921
Reclaimed Water Supply(4)	11,201	14,952	14,952	14,952	14,952
Total Supply	63,131	67,612	69,517	67,834	66,281
% of Normal Year	88%	89%	89%	88%	88%
Demands					
Imported Water	23,865	21,557	21,917	22,325	22,766
Groundwater(3)	23,865	21,557	21,917	22,325	22,766
Reclaimed Water(6)	6,096	8,023	8,023	8,023	8,023
Total Demand	53,826	51,137	51,857	52,673	53,555
% of Year 2010(5)	121%	115%	117%	119%	121%
Difference Supply - Demand	9,305	16,475	17,660	15,161	12,726
Difference as % of Supply	15%	24%	25%	22%	19%
Difference as % of Demand	17%	32%	34%	29%	24%

Notes:
1. From Table 7.8.
2. Calculated by multiplying the imported water demand with the imported water supply (%) from Row 1.
3. Groundwater demands are established at 50% of total potable demands.
4. Reclaimed water supply for 2015 is determined by tertiary treatment capacity in 2010; a portion of available wastewater flows were used for year 2020 and thereafter.
5. Year 2010 deliveries were 44,331 AFY.
6. Reclaimed water demands are not projected to offset potable demands since the projected demands are based on 20x2020 per-capita targets, which already incorporate water conservation and offsets. Note that the City could work to convert more customers to reclaimed water during a drought year, but this effort would take time to implement.

As shown in Table 7.11, imported water supply availability is projected to increase more (6 to 36 percent) than City's demands. This difference indicates that, similar to average year conditions, it is reasonable to expect that MWDSC would have sufficient supplies available to accommodate projected demands under single dry year conditions as the City would receive its proportional share of increased supplies.

The ratios presented in Table 7.11 were used to project imported water supply availability for each planning year. By combining imported water supplies with other supply sources, total available supply availability was calculated. The available supplies were then compared with projected demands to determine if the City has sufficient water supplies available to meet future demands under single dry year conditions. This summary is presented in Table 7.12.

As shown in Table 7.12, it is projected that the City has sufficient supplies available to meet both potable and reclaimed water demands through 2035 under single dry year conditions with a total supply surplus ranging from 17 to 34 percent of the projected demands. Although the reclaimed water supply of 14,952 cannot be used to meet potable demands, removing the 7,000 AFY difference between reclaimed water supply and reclaimed water demand does not affect the conclusion that sufficient supplies are available to meet demands.

7.5.3 Multiple Dry Years

The projected average year potable and reclaimed water demands were increased by 17 percent to estimate water demands during both single and multiple dry years. Projected imported water supplies were obtained from MWDSC's Regional 2010 UWMP. The projected multiple dry year demands and supplies were compared in 5-year increments in Table 7.13 through Table 7.16. Details on the calculations of the values presented in this table are included in Appendix H.

Table 7.13 Comparison of Supply and Demands under Multiple Dry Years

Row	Description	2015	2020	2025	2030	2035
1	City of Corona Demand Increase as % of 2010 Demand	108%	97%	99%	101%	103%
2	MWDSC Supply Increase as % of 2010 Supply	86%	92%	96%	94%	92%
3	MWDSC Supply as % of Demand	101%	110%	110%	105%	101%
4	**Difference MWD Supply Increase and City Demand Increase(2) (Row 3 – Row 1)**	-7%	13%	12%	4%	-2%

Notes:
1. Details on the calculations in each row are included in Appendix H.
2. These percentages apply to the imported water component of the City's supply mix. See Tables 7.14, 7.15, and 7.16 for the other components.

The data in Table 7.13 shows an important change in supply values. As a percent of demand, the imported water supplies are projected to increase less (-7 to +13 percent) than City demands. This difference indicates that City demands on imported water in a multiple dry year scenario might outpace MWDSC's growth in supply. As this difference is based on percentage growth however, it is important to consider the absolute values presented in the tables below.

The ratios presented in Table 7.13 are used to project the imported water supply availability for each planning year. By combining the imported water supplies with the other supply sources, the total available supply capacity is calculated. The available supplies are then compared with the projected demands to determine if the City has sufficient water supplies available to meet future demand under multiple dry year conditions. This summary is presented in Table 7.14 (Dry Year 1), Table 7.15 (Dry Year 2), and Table 7.16 (Dry Year 3).

Table 7.14 Supply and Demand Comparison – Multiple Dry Year No. 1

Water Sources	2015	2020	2025	2030	2035
Supply					
Projected Supply as a % of Demand During Multiple Dry Years(1)	101%	110%	110%	105%	101%
Imported Water Supply(2)	23,993	23,813	24,192	23,470	22,918
Groundwater Supply(3)	24,921	24,921	24,921	24,921	24,921
Reclaimed Water Supply(4)	11,201	14,952	14,952	14,952	14,952
Total Supply	60,115	63,686	64,065	63,343	62,791
% of Normal Year	84%	83%	82%	83%	84%
Demands					
Imported Water	23,865	21,557	21,917	22,325	22,766
Groundwater(3)	23,865	21,557	21,917	22,325	22,766
Reclaimed Water(6)	6,096	8,023	8,023	8,023	8,023
Total Demand	53,826	51,137	51,857	52,673	53,555
% of Year 2010(5)	121%	115%	117%	119%	121%
Difference Supply - Demand	6,290	12,549	12,208	10,670	9,236
Difference as % of Supply	10.5%	20%	19%	17%	14.7%
Difference as % of Demand	11.7%	25%	24%	20%	17.2%

Notes:
1. From Table 7.8.
2. Calculated by multiplying the imported water demand with the imported water supply (%) from Row 1.
3. Groundwater demands are established at 50% of total potable demands.
4. Reclaimed water supply for 2015 is determined by tertiary treatment capacity in 2010; a portion of available wastewater flows were used for year 2020 and thereafter.
5. Year 2010 deliveries were 44,331 AFY.
6. Reclaimed water demands are not projected to offset potable demands in conservation projections since water conservation projections are targets that are independent of any potable water demand projections which would be subject to further offsets.

Similar to the single-dry year, the imported water supplies shown in Table 7.14, Table 7.15, and Table 7.16 are based on the amount of supply MWDSC anticipates having available in multiple dry years as a percentage of normal year demands. While hydraulic capacity of the imported water connections and treatment capacity may exceed the imported water supply shown, it is anticipated that MWDSC's available supply of imported water will be the limiting factor in the City's imported water supply.

Table 7.15 Supply and Demand Comparison – Multiple Dry Year No. 2

Water Sources	2016	2021	2026	2031	2036
Supply					
Projected Supply as a % of Demand During Multiple Dry Years(1)	101%	110%	110%	105%	101%
Imported Water Supply(2)	23,529	23,893	24,282	23,563	23,008
Groundwater Supply(3)	24,921	24,921	24,921	24,921	24,921
Reclaimed Water Supply(4)	11,201	14,952	14,952	14,952	14,952
Total Supply	59,651	63,766	64,155	63,436	62,881
% of Normal Year	83%	84%	82%	83%	84%
Demands					
Imported Water	23,403	21,629	21,999	22,413	22,856
Groundwater(3)	23,403	21,629	21,999	22,413	22,856
Reclaimed Water(6)	6,096	8,023	8,023	8,023	8,023
Total Demand	52,903	51,281	52,020	52,850	53,735
% of Year 2010(5)	119%	116%	117%	119%	121%
Difference Supply - Demand	6,749	12,485	12,135	10,587	9,146
Difference as % of Supply	11.3%	20%	19%	17%	14.5%
Difference as % of Demand	12.8%	24%	23%	20%	17.0%

Notes:
1. See footnotes listed in Table 7.14.

Similar to the single dry year, reclaimed water supplies are based on the treatment capacity of the City's WRFs. It is anticipated that the treatment capacity of the WRFs will be the limiting factor in the quantity of reclaimed water supply available and that the multiple year drought will have a limited impact on the quantity of wastewater available for use in the reclaimed water system. Note that the reclaimed water demands are anticipated to increase in multiple dry years similar to potable water demands. It is expected that the decreased rainfall associated with a multiple dry year scenario will require additional irrigation demands.

As discussed in Section 7.4.1, historically demands have decreased in later years of a multiple dry year scenario due to the mandatory conservation efforts associated with a drought. However, for conservative planning purposes, demands are assumed to continue to be elevated in each year of the drought due to the decreased precipitation and associated increase in irrigation requirements.

Table 7.16 Supply and Demand Comparison – Multiple Dry Year No. 3

Water Sources	2017	2022	2027	2032	2037
Supply					
Projected Supply as a % of Demand During Multiple Dry Years(1)	101%	110%	110%	105%	101%
Imported Water Supply(2)	23,065	23,972	24,372	23,656	23,099
Groundwater Supply(3)	24,921	24,921	24,921	24,921	24,921
Reclaimed Water Supply(4)	11,201	14,952	14,952	14,952	14,952
Total Supply	59,187	63,845	64,245	63,529	62,972
% of Normal Year	83%	84%	82%	83%	84%
Demands					
Imported Water	22,942	21,701	22,080	22,501	22,946
Groundwater(3)	22,942	21,701	22,080	22,501	22,946
Reclaimed Water(6)	6,096	8,023	8,023	8,023	8,023
Total Demand	51,980	51,425	52,184	53,026	53,915
% of Year 2010(5)	117%	116%	118%	120%	122%
Difference Supply - Demand	7,208	12,420	12,062	10,503	9,057
Difference as % of Supply	12.2%	19%	19%	17%	14.4%
Difference as % of Demand	13.9%	24%	23%	20%	16.8%

Notes:
1. See footnotes listed in Table 7.14.

As shown in Table 7.14 through Table 7.16, the projected demands for each source are lower than the projected supplies in each year of a 3-year multiple dry year period.

As with normal year and dry year scenarios, the reclaimed water supply cannot be used to meet potable demands, but even after removing the 7,000 AFY of surplus of reclaimed supply (the difference between reclaimed water supply and reclaimed water demand), sufficient potable water supplies are available to meet potable demands in all 3 years of the multiple dry year scenario. In the projected year with the least supply surplus, year 2015 as the first year in multiple dry year sequence, there is 6,290 AFY of surplus including reclaimed water. After deducting the 5,106 AFY surplus of reclaimed water, there is still a surplus of 1,184 AFY when comparing potable supplies to potable demands. In that scenario, the potable surplus is still 2 percent greater than the potable demand.

Although the increase in demands outstrips MWDSC's growth in supply as a percentage, MWDSC is still projected as being able to meet the total volume of potable water needed by the City. In several of the multiple dry year scenarios, MWDSC supply capability will be taxed within a few hundred acre feet of its availability, but in all cases demands will be met. It should be noted that these dry year demand summaries include two key conservative planning assumptions as discussed in the methodology.

The projected available supply from MWDSC only includes the existing supply programs and does not include the programs that are currently under development that are estimated

to increase the imported water supplies by 17 to 39 percent, depending on the planning year and hydrologic conditions (see Table 7.1). It should be noted that these planned programs increase the total available imported water supply relatively more during single and multiple dry years than during average years.

Both potable water and reclaimed water demands during single and multiple dry years are assumed to increase by 17 percent, which represents the maximum per capita demand increase in the period 1990 through 2009.

Based on the positive supply surplus shown in this section and the two conservative planning assumptions listed above, it can be concluded that the City has sufficient supplies available to meet both potable and reclaimed water demands through 2035 under average, single dry year, and multiple dry year conditions.

7.6 TRANSFER AND EXCHANGE OPPORTUNITIES

Regional water transfer and exchange opportunities were provided by the 2005 UWMP and Integrated Regional Water Management Plan.

Table 7.17 Water Transfer and Exchange Opportunities

Source Water Transfer	Transfer or Exchange	Short Term or Long Term	Proposed Volume (AFY)
City of Riverside	Transfer	Short Term	2,210
Lee Lake Water District	Transfer	Short Term	-
EVMWD	Transfer	Short Term	5,000
Western Riverside Corona Feeder	Transfer	Short Term	-
Riverside Gage Canal	Transfer	Short Term	-
SAWPA	Transfer	Short Term	18,100
Total			**25,310**

As shown, the City is planning multiple short term transfer projects with regional partners. However, the City is not anticipating any long term transfer projects or opportunities at this time.

7.7 WATER QUALITY IMPACTS ON SUPPLY

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 5-year increments as described in subdivision (a) of Section 10631 and the manner in which water quality affects management strategies and supply reliability.

7.7.1 Local Groundwater Quality

The groundwater in the City's region tends to be highly mineralized. TDS concentrations in the Coldwater and Bedford subbasins are generally lower and range from 300 to 650 mg/L. The average TDS range for the Temescal Basin is much higher, ranging from 307 to 1,950 mg/L.

Elevated nitrate concentrations have been documented in the Temescal Subbasin since at least the 1950s. 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. This is what necessitates the use of the Temescal Desalter for the City to utilize groundwater from the Temescal Basin. The highest nitrate concentrations are 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 measured in the City production wells typically range from 4.0 to 110 mg/L. Most wells will continue to require treatment and/or blending to meet regulatory requirements.

In the Coldwater Subbasin, groundwater nitrate concentrations 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; however, one recent sample from a Bedford Subbasin well indicated a relatively low nitrate (as N) concentration of 1.2 mg/L[4].

It is anticipated that the City will continue to depend on groundwater as a reliable water supply source; however, with the current treatment and desalination capabilities water supply changes due to water quality are not expected.

7.7.2 Imported Water Quality

The City's imported water is supplied by MWD through WMWD. Details of MWDSC's water quality can be found in its 2010 RUWMP.

7.8 OPPORTUNITIES FOR DESALINATED WATER

10631. A plan shall be adopted in accordance with this chapter and shall do all of the following:

10631 (i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long term supply.

[4] GWMP, 2008

The UWMPA requires that the UWMP address the opportunities for development of desalinated water, including ocean water, brackish water, and groundwater. The opportunities for the City and MWDSC are described separately below.

7.8.1 City of Corona Desalination Opportunities

As summarized in Table 7.18, there are no future opportunities for further desalination.

Table 7.18 Desalination Opportunities for the City of Corona

Sources of Water	Future Opportunities for Desalinated Water
Ocean Water	None
Brackish Ocean Water	None
Brackish Groundwater	Already in Place
Other	None

7.8.2 Groundwater Desalination

As mentioned in Chapter 3, while the Coldwater Subbasin provides relatively high quality water, the Temescal Basin does not meet the EPA and DHS MCL's for nitrate (45 mg/L). The shallow basin groundwater typically has high levels of nitrate (4.0 to 110 mg/L) that require treatment and/or blending to meet regulatory requirements.

The Temescal Desalter is located in the northern part of the City and has a total rated capacity of 15 mgd. The Temescal Desalter serves to reduce nitrate and TDS levels in local groundwater to meet drinking water quality standards (nitrate) and wastewater discharge standard (TDS).

Additional desalination efforts include the Integrated Chino – Arlington Desalter System Project (ICADSP). The City is considering purchasing water when the project is implemented. It is estimated that up to 18,000 AFY may be available once the ICADSP is completed. The City does not currently have other opportunities or needs for groundwater desalination.

7.8.3 Seawater Desalination

It is neither practical nor economically feasible to implement a seawater desalination program at this time. Due to geographic placement of the City's service area, it would not be cost effective to pump desalinated water from the ocean.

7.8.4 MWDSC's Desalination Program

Although the City has not identified any specific project opportunities for desalination of seawater at this time, other desalination projects developed by MWDSC within the region indirectly benefit the City. The recent efforts to develop and implement desalination by MWDSC as described in its regional 2010 UWMP are summarized below.

MWDSC's Seawater Desalination Program (SDP) was created in 2001 to encourage the development of seawater desalination by local agencies and was modeled after the Local Resources Program (LRP). Like the LRP, it offers sliding-scale incentives to member and local agencies that proceed up to $250/acre-foot of produced supplies. The incentive is designed to accelerate the development of expensive local supply projects by member agencies by lowering their cost. MWDSC has entered into four SDP agreements, while a fifth potential agreement with the Los Angeles Department of Water and Power (LADWP) that could potentially produce up to 28,000 AFY, is currently on hold. In addition, there are currently three other desalination projects under development by local agencies within MWDSC's service area outside the SDP. The desalination projects are summarized in Table 7.19. The potential capacity of all these combined projects range from 270,000 to 422,000 AFY.

Table 7.19 MWDSC Desalination Project Opportunities

Project Name	Member Agency	Capacity (AFY)	Status N/A
Long Beach Seawater Desalination Project(1)	LBWD	10,000	Pilot Study
South Orange Coastal Ocean Desalination Project(1)	MWDOC	16,000-28,000	Pilot Study
Carlsbad Seawater Desalination Project(1)	SDCWA	56,000	Permitting
West Basin Seawater Desalination Project(1)	WBMWD	20,000	Pilot Study
LADWP Seawater Desalination Project	LADWP	28,000	Unknown
Huntington Beach Seawater Desalination Project	MWDOC	56,000	Permitting
Camp Pendleton Seawater Desalination Project	SDCWA	56,000-168,000	Planning
Rosarito Beach Seawater Desalination Feasibility Study	SDCWA	28,000-56,000	Feasibility Study

Notes:
1. These SDPs have executed incentive agreements with MWDSC.

To promote the development of local seawater desalination projects, MWDSC provides regional facilitation by supporting member agency projects during permit hearings and other proceedings, coordinating responses to potential legislation and regulations, and working with the member agencies to resolve related issues, such as greenhouse gas emission standards and seawater intake regulations, that could impact the projects. MWDSC has also formed a special committee to find additional ways to promote potential projects and explore opportunities for developing regional seawater desalination supplies.

WATER SHORTAGE CONTINGENCY PLAN

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that includes stages of action to be undertaken in the event of water supply shortages; a draft water shortage contingency resolution or ordinance; prohibitions, consumption reduction methods and penalties; an analysis of revenue and expenditure impacts and measures to overcome these impacts; actions to be taken during a catastrophic interruption; and a mechanism for measuring water use reduction.

This chapter references several relevant ordinances and resolutions related to water conservation. These ordinances and resolutions are represented in Table 8.2 and provided in Appendix F for reference.

Table 8.1 City Ordinances and Resolutions for Water Shortage Measures

Ordinance or Resolution Number	Date	Objective of Legislation
Ordinance 2962	7 January 2009	Details the adoption, implementation and enforcement of the City's water conservation program.
Ordinance 2996	1 July 2009	Amends City watering restrictions.
Ordinance 3025	17 February 2010	Implements a budget-based, tiered structure for water rates.

Notes:
Copies are available in Appendix F.

8.1 STAGES OF ACTIONS

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses specified issues.

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (a) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50-percent reduction in water supply and an outline of specific water supply conditions which are applicable to each stage.

8.1.1 Water Shortage Stages and Reduction Objectives

The City has invested considerable effort and capital in developing a diverse water supply to ensure redundancy and flexibility in dealing with supply interruptions.

Historically, the City has responded to water shortages through implementation of conservation measures. In 1991, the City adopted a resolution for a program of voluntary reduction of nonessential uses of water to reduce consumption by 15 percent during the multiple year drought at the time. In addition, the City implemented penalty rates during a water shortage emergency.

Currently, Chapter 13.26 of the Corona Municipal Code, as amended by Ordinance 2962 (included in Appendix F), details the City's current water conservation rules and water shortage contingency plan. The stages and their objectives can be found in Table 8.1.

Table 8.2 Water Shortage Stages and Reduction Objectives

Stage	Description	Objectives
1	Normal Water Supply	• Applies during periods when the City is able to meet all of the water demands of its customers. • In effect at all times unless the City Council otherwise declares that another water conservation stage is in effect.
2	Minimum Water Shortage	• 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 customers shall reduce their water consumption by **10 to 15 percent** of a base year consumption amount.
3	Moderate Water Shortage	• Applies during periods when the City will not be able to meet all of the water demands of its customers. • The objective of the measures undertaken in Water Conservation Stage 3 is to reduce water system consumption within the City by **16 to 20 percent** as determined and recommended by the General Manager. • 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.
4	Severe Water Shortage	• Applies during periods when the City will not be able to meet all of the water demands of its customers. • The objective of the measures undertaken in Water Conservation Stage 4 is to reduce water consumption within the City by **21 to 40 percent** as determined and recommended by the General Manager.
5	Critical Water Shortage	• The objective of the measures undertaken in Water Conservation Stage 5 is to reduce water consumption by **40 percent or more** as determined and recommended by the General Manager. • 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.

Notes:
The list of actions undertaken in each stage is provided in Section 8.2.1.

As shown in Table 8.1, the water shortage stages include consideration of water shortages up to Stage 5, a Critical Water Shortage, which includes reductions in water consumption by 40 percent or more.

8.2 PROHIBITIONS, CONSUMPTION REDUCTION METHODS, AND PENALTIES

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses methods to reduce consumption.

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (d) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.
>
> 10632 (e) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50-percent reduction in water supply.
>
> 10632 (f) Penalties or charges for excessive use, where applicable.

8.2.1 Mandatory Prohibitions on Water Wasting

The City's reduction methods used to meet the goals presented in Table 8.1 are as follows:

- Stage 1 – Normal Water Supply:
  - All normal water efficiency programs and water conservation regulations of the City, including the City's landscape design guidelines for commercial and industrial developments may be adopted.
  - Allowing water to drain onto adjacent properties or streets due to excessive irrigation or leaks is prohibited.
  - Failing to repair a water leak is prohibited.
  - Using water to wash down outdoor surfaces such as sidewalks, driveways, parking areas, and tennis courts (except for safety or sanitation hazards) is prohibited.
- Stage 2 – Minimum Water Shortage:
  - Lawns or ground covers may be watered and landscaping may be irrigated for a maximum of 20 minutes per station per day three days per week (reclaimed water use permitted at any time).
  - 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.

- Stage 3 – Moderate Water Shortage:
  - 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, with irrigation reduced from three days per week to two days per week.
  - Water customers shall reduce their water consumption by 16 to 20 percent, as determined and recommended by the General Manager, from the base year consumption.
  - 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 11 regulatory agencies. Construction projects requiring water for new landscapes shall adhere to the designated days and watering windows.
- Stage 4 – Moderate Water Shortage:
  - 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, with irrigation reduced from two days per week to one day per week.
  - Irrigation of landscaping shall be limited to supporting minimal survival of trees and shrubs (reclaimed water shall not be permitted to run into city streets or the City storm water conveyance system).

- 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.
- 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.

- Stage 5 – Critical Water Shortage:
  - 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.
  - All outdoor watering and irrigation of lawns and ground cover, and landscaping is prohibited.
  - 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.

8.2.2 Water Reduction Stage Triggering Mechanisms

The mechanisms which trigger the City's reduction methods presented in Table 8.1 are as follows:

- Stage 1:
  - In effect at all times, unless another stage has been declared.
- Stage 2:
  - A regional water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use.
  - Groundwater wells are inoperable or unusable.
  - Alternative water supplies are limited or unavailable.
  - 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.
- Stage 3:
  - A regional water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use.

- Groundwater wells are inoperable or unusable.
- Alternative water supplies are limited or unavailable.
- 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.

- Stage 4:
  - A regional water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use.
  - Groundwater wells are inoperable or unusable.
  - Alternative water supplies are limited or unavailable.
  - 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.
  - 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.
- Stage 5:
  - A regional water supply shortage exists and a regional public outreach campaign is being implemented asking or requiring all persons to reduce water use.
  - Groundwater wells are inoperable or unusable.
  - Alternative water supplies are limited or unavailable.
  - 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.
  - 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.

8.2.3 Excessive Use Penalties

According to the Corona Municipal Code, a violation of any of the prohibitions 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.

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 to Chapter 13.26 of the Corona Municipal Code.

According to Ordinance 2962 located in Appendix F, 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 Chapter 13.26. Fees and charges may include costs for a visiting water conservation specialist, or other City staff, cost of monitoring, inspection, and surveillance, cost of enforcing compliance, cost of reinitiating service, and the cost of processing any fees necessary to carry out the provisions of the City's water conservation regulatory program.

8.2.4 Review Process

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.

8.3 WATER SHORTAGE CONTINGENCY ORDINANCE/RESOLUTION

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that includes a draft water shortage contingency resolution or ordinance.

UWMPA:

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (h) A draft water shortage contingency resolution or ordinance.

The City's water shortage contingency plan is established in Ordinance 2962, included in Appendix F. The restrictions were amended in Ordinance 2996, also included in Appendix F.

8.4 REVENUE AND EXPENDITURE IMPACTS/MEASURES TO OVERCOME IMPACTS

According to the UWMPA, the UWMP is required to include an urban water shortage contingency analysis that addresses the financial impacts from reduced water sales.

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (g) An analysis of the impacts of each of the actions and conditions described in subdivisions (a) to (f), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.
>
> 10632 (g) An analysis of the impacts of each of the proposed measures to overcome those revenue and expenditure impacts, such as the development of reserves and rate adjustments.

The majority of operating costs for most water agencies are fixed rather than a function of the amount of water sold. As a result, when significant conservation programs are undertaken, as is necessary during a water shortage, it is frequently necessary to raise water rates because the revenue generated is based on lower total consumption while the revenue required is basically fixed.

It is anticipated that the City will determine the extent of any revenue and expenditure imbalance as well as proposed measures to overcome impacts to City revenues and expenditure imbalances at the time the water shortage has started. Some possible actions the City can take include utilizing reserves or raising rates in event of a sustained water shortage. On a longer term basis, reductions in water demands, especially peak demands, can delay the need to develop costly new water sources in growing communities. Therefore, to help offset some lost revenues, expansion projects can be delayed.

8.5 ACTIONS DURING A CATASTROPHIC INTERRUPTION

The UWMPA requires that the UWMP include an urban water shortage contingency analysis that addresses a catastrophic interruption of water supplies.

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (c) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.

The forth and fifth water shortage stages of the City's water shortage contingency plan indicate catastrophic interruption as a triggering mechanism. In the event of a catastrophic interruption, the City would proceed directly to a stage four or stage five water shortage.

8.6 REDUCTION MEASURING MECHANISM

> 10632. The plan shall provide an urban water shortage contingency analysis, which includes each of the following elements, which are within the authority of the urban water supplier:
>
> 10632 (i) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

The City's water system currently has water meters on all production sources and customer connections. These meters record the amount of water consumed at each location. Customer consumption totals are tallied on a bi-monthly basis for billing purposes. The City will monitor City water consumption during a shortage more closely by reviewing water production records on a frequent basis to determine if water use is actually being reduced. In addition, the City can also periodically review customer consumption patterns to determine if water use is declining.