

Public Review Draft

2020 Urban Water Management Plan

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Acronyms and Abbreviations

µg/L	micrograms per liter
2010 UWMP	<i>2010 Urban Water Management Plan</i>
2015 UWMP	<i>2015 Urban Water Management Plan</i>
2020 UWMP	<i>2020 Urban Water Management Plan</i>
AAC	All-American Canal
AF	acre-feet
AFY	acre-feet per year
AWE Tool	Alliance for Water Efficiency Water Conservation Tracking Tool
Bay-Delta	Sacramento-San Joaquin Bay-Delta
BCCA	bias-corrected constructed analog
BDCP	Bay-Delta Conservation Plan
BiOp	<i>Biological Opinion</i>
BMP	best management practice
Board	San Diego County Water Authority Board
CALFED	CALFED Bay-Delta Program
Carlsbad Desalination Plant	Claude “Bud” Lewis Carlsbad Desalination Plant
CC	Coachella Canal
CEC	constituent of emerging concern
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CII	commercial, industrial and institutional
CIP	capital improvement projects
CMIP5	World Climate Research Program’s Coupled Model Intercomparison Project Phase 5
County	San Diego County
CRA	Colorado River Aqueduct
CSP	Carryover Storage Project
CUWCC	California Urban Water Conservation Council
CY	Calendar Year
DAC	disadvantaged community
DBP	disinfection byproduct
DCP	<i>Lower Basin Drought Contingency Plan</i>

Acronyms and Abbreviations

DDW	State Water Resources Control Board Division of Drinking Water
DMP	Drought Management Plan
DWR	California Department of Water Resources
EC	electrical conductivity
EIR/EIS	environment impact report/environmental impact statement
EMP	Energy Management Policy
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESP	Emergency Storage Project
FY	Fiscal Year
GCM	general circulation model
GHG	greenhouse gas
GPCD	gallons per capita per day
GSA	groundwater sustainability agency
GSP	groundwater sustainability plan
IID	Imperial Irrigation District
ICP	Integrated Contingency Plan
IRWM	integrated regional water management
ICS	Intentionally Created Surplus
LAFCO	Local Agency Formation Commission
M&I	municipal and industrial
MAAP	Member Agency Administered Program
Master Plan Update	<i>2013 Regional Water Facilities Optimization and Master Plan Update</i>
MCB	Marine Corps Base
MCL	maximum contaminant level
Metropolitan	Metropolitan Water District of Southern California
MDO	Model Drought Ordinance
MDRCPO	Model Drought Response Conservation Program Ordinance
mg/L	milligrams per liter
MGD	million gallons per day
MOA	Memorandum of Agreement
MTCO _{2e}	metric tons of carbon dioxide equivalent
MWELO	Model Water Efficient Landscape Ordinance

Acronyms and Abbreviations

NASA	National Aeronautics and Space Administration
NDMA	nitrosodimethylamine
NPDES	National Pollutant Discharge Elimination System
pCi/L	picocuries per liter
PFAS	per- and poly-fluoroalkyl substance
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
Poseidon Water	Poseidon Water LLC
ppt	parts per trillion
PSWAR	Permanent Special Agricultural Water Rate
PUMA	Piloting Utility Modeling Application Project
QSA	Quantification Settlement Agreement
QWEL	Qualified Water-Efficient Landscaper Training
RCP	representative concentration pathways
REC	renewable energy credit
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
Recycled Water Policy	Policy for Water Quality Control for Recycled Water
R-GPCD	Residential gallons per capita per day
RF	radiative forcing
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SBX7-7	Senate Bill 7 as part of the Seventh Extraordinary Session
SDG&E	San Diego Gas & Electric
SDWA	Safe Drinking Water Act
SGMA	Sustainable Groundwater Management Act
SWRCB	State Water Resources Control Board
TCP	1,2,3-trichloropropane
TDS	total dissolved solids
TOC	total organic carbon
Transfer Agreement	Water Authority-Imperial Irrigation District Water Conservation and Transfer Agreement
TSAWR	Transitional Special Agricultural Water Rate Program
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act

Acronyms and Abbreviations

VIC	variable infiltration capacity
Water Authority	San Diego County Water Authority
Water Distribution Plan	<i>The Water Distribution Plan, a Capital Improvement Program through the Year 2010</i>
WQCP	<i>Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary</i>
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDRP	Water Shortage and Drought Response Plan
WTP	water treatment plant
WUCA	Water Utility Climate Alliance

EXECUTIVE SUMMARY

The San Diego County Water Authority (Water Authority) has prepared this *2020 Urban Water Management Plan* (2020 UWMP) in accordance and compliance with the Urban Water Management Planning Act (UWMP Act). The Water Authority's 2020 UWMP serves as the long-term planning document that will help to ensure a reliable water supply for the region. This Executive Summary satisfies the requirement of CWC Section 10630.5 to include a simple lay description of information necessary to provide a general understanding of the plan, including a description of the Water Authority's reliable water supply, challenges ahead, and strategies for managing reliability risks.

ES.1 Introduction

The Water Authority's mission is to provide a safe and reliable supply of water to its 24 member agencies serving the San Diego region. The Water Authority is San Diego County's predominant source of water, supplying from 75% to 95% of the region's needs to the member agencies that purchase water for retail distribution in their service territories. The 2020 UWMP identifies a diverse mix of water resources planned to be developed over the next 25 years to ensure that the region has enough water to meet its needs, including during drought periods.

ES.1.1 Service Area Characteristics

The population within the Water Authority's service area was approximately 3.3 million people in 2020 and is projected to increase to roughly 3.8 million people by 2045. The County of San Diego is expected to develop an additional 130,000 acres between 2020 and 2050, with the majority (125,000 acres) of development dedicated to residential land uses. These regional growth projections are based on the San Diego Association of Governments [SANDAG] *Series 14 Regional Growth Forecast* (version 17; SANDAG, 2019a), developed for its *2019 Federal Regional Transportation Plan* (SANDAG, 2019b) adopted by SANDAG's Board of Directors on October 25, 2019.

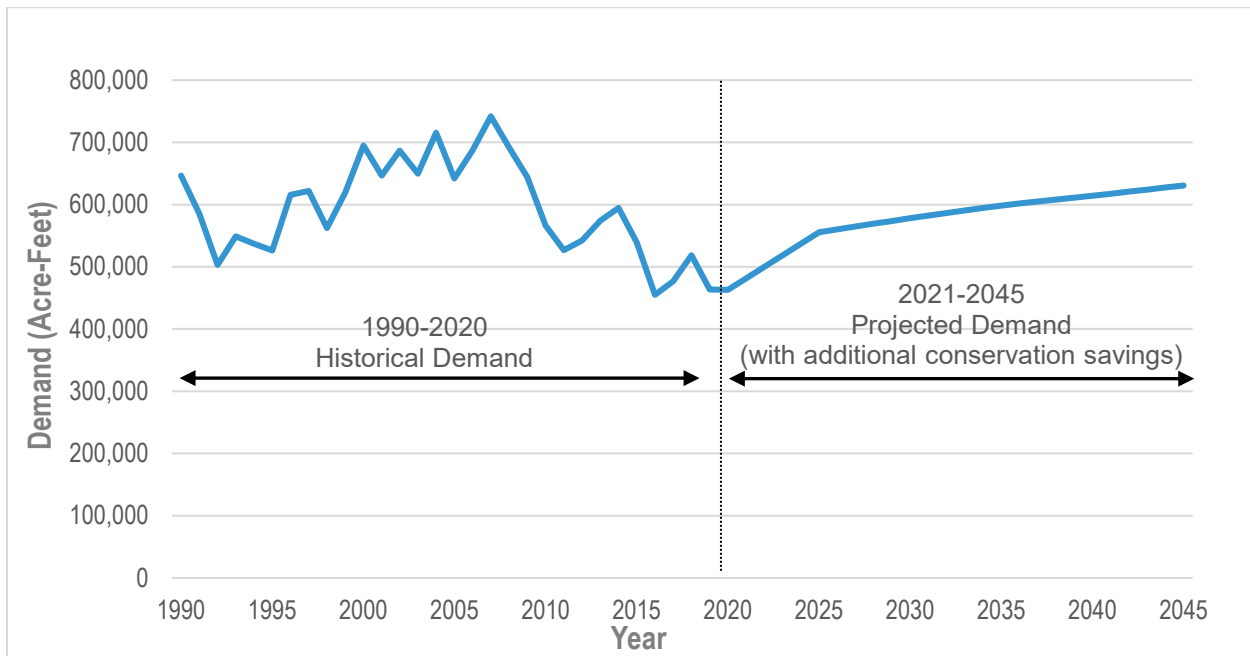
Climate within San Diego county is characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (°F) and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast and in excess of 33 inches per year in the inland mountains.

ES.2 Water Demands

In fiscal year 2020, total water demand in the Water Authority's service area was 463,128 acre-feet (AF), of which 92% was for municipal and industrial (M&I) use and 8% was for agricultural water use. By 2045, the Water Authority's total water demands are projected to reach 630,771 AF, which represents a 36% increase from the fiscal year 2020 demands. This projection accounts for planned future water conservation savings.

By comparison, in fiscal year 2007, water demand in the Water Authority’s service area reached a record level of 741,893 AF. The drop in water demand since 2007 is attributable to a combination of factors, including above-average rainfall in four of the last five fiscal years, continuing conservation efforts, a growing water use efficiency ethic, and consumer price response to the retail cost of water. Figure ES-1 shows the historical and projected normal year water demands for the Water Authority’s service area.

Figure ES-1: Regional Historical and Projected Normal Water Demands (AF)



ES.3 Demand Management

Demand management, or water-use efficiency, is an important ongoing component of the Water Authority’s long-term strategy to increase the reliability of the San Diego region’s water supply through diversifying its water supply portfolio. Since 1991, in partnership with and support of its member agencies, the Water Authority’s programs and initiatives cumulatively have conserved more than 1 million AF of water. The Water Authority continues to support its member agencies in complying with water use efficiency targets through a combination of regionally and locally administered active and passive water conservation measures, programs, and policies, as well as the use of recycled water.

The Water Authority has consistently promoted water-use efficiency programs through its communications and outreach channels as part of its overall long-term strategy to improve the reliability of the region’s water supplies. The Water Authority has implemented focused outreach efforts on building awareness and public acceptance for water-use efficiency as a desirable lifestyle and a permanent civic responsibility. The Water Authority has also been a statewide leader in sponsoring legislation to improve water-use efficiency standards since 1991, including three measures since the 2015 UWMP.

In November 2009, the California State Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session (Senate Bill X7-7), which became effective February 3, 2010. This law was the water conservation component to the Bay-Delta legislation package, and sought to achieve a 20% statewide reduction in urban per capita water use in California by December 31, 2020. The law required each urban retail water supplier to develop urban water-use targets to help meet the 20% goal by 2020. The Water Authority has assisted its member agencies through the implementation of various conservation incentive and education programs detailed in *Section 3 Demand Management*. The Senate Bill X7-7 potable demand target calculated for member agencies in 2020 was 619,323 acre-feet (AF), and actual potable water use was 457,964 AF.

ES.4 Water Authority Supplies

Historically, the Water Authority has relied solely on imported water supplies purchased from the Metropolitan Water District of Southern California (Metropolitan) to meet the needs of its member agencies. Metropolitan's supplies come from two primary sources, the State Water Project and the Colorado River. After experiencing severe shortages from Metropolitan during the 1987 to 1992 drought, the Water Authority began methodically pursuing actions to diversify the region's supply sources.

ES.4.1 Water Authority-Imperial Irrigation District Water Conservation and Transfer Agreement

In 1998, the Water Authority entered into a Water Conservation and Transfer Agreement with IID, an agricultural district in neighboring Imperial County. Through this transfer agreement, the Water Authority began receiving conserved water from IID after the execution of the Quantification Settlement Agreement (QSA) in 2003, first at 10,000 AF with the volume increasing per the agreement terms year-over-year until it will reach 200,000 acre-feet per year (AFY) in 2021. Also as part of the QSA, the Water Authority contracted for 77,700 AFY of conserved water from projects to line the All-American Canal (AAC) and Coachella Canal (CC). Deliveries of this conserved water from the CC reached the region in 2007, and deliveries from the AAC reached the region in 2010.

ES.4.2 Carlsbad Desalination Plant

To further diversify regional supplies, the Water Authority's 2005 and 2010 UWMPs identified seawater desalination as a potential supply for meeting future demands. In keeping with the objective of these plans, the Water Authority entered into a formal Water Purchase Agreement with Poseidon Water, a private investor-owned company, in November 2012. The Water Purchase Agreement details commercial and financial terms for the development and purchase of desalinated ocean water produced at the Carlsbad Desalination Plant. Construction began in 2012 and commercial operation began in December 2015. This facility is currently in commercial operation and is capable of producing up to 56,000 AFY.

ES.4.3 Dry Year Supplies

In addition to Water Authority supplies expected during a normal water year, the Water Authority has also invested in carryover storage supplies to help achieve reliability in dry years and multiple dry years, as discussed in *Section 9.3, Dry Water Year Assessment*. The Water Authority's carryover storage supply program includes both in-region surface water storage and out-of-region groundwater storage in California's Central Valley.

ES.5 Member Agencies Supplies

Local water resources developed and managed by the Water Authority's member agencies are critical to securing a diverse and reliable water supply for the region. Local projects reduce demands for imported water and provide member agencies with a drought-resilient supply. These supplies include surface water, groundwater, recycled water, potable water for reuse, desalinated seawater, and water transfers.

Since 1980, a range of 5% to 36% of the water used in the Water Authority's service area has come from local sources, primarily from surface water reservoirs with yields that vary directly with annual rainfall. A growing share of local supply comes from recycled water, groundwater recovery, potable reuse, and seawater desalination projects. These projects are considered drought-resilient since the supplies are primarily independent of precipitation. Additionally, local supplies include water transfers with implementation of the San Luis Rey Water Transfer. In fiscal year 2020, total local water sources provided 28% of the water used in the Water Authority's service area.

ES.6 Metropolitan Water District of Southern California Supplies

The Water Authority relies on water purchases from Metropolitan to meet its supplemental supply gap. The Water Authority, one of 26 Metropolitan member agencies, is historically the largest purchaser of Metropolitan water. However, as the Water Authority and its member agencies have increased their locally controlled water resources and investments in water use efficiency, the Water Authority's Metropolitan purchases have declined. In fiscal year 2020, the Water Authority purchased 62,852 AF, or about 6%, of all the water Metropolitan sold. Metropolitan's Final Draft 2020 UWMP report states that Metropolitan is capable of meeting expected demands for its member agencies under normal and dry year conditions through 2045.

ES.7 Water Quality

The Water Authority must protect the quality of the water passing through its delivery system and communicate water quality changes to its member agencies. The San Diego region's water quality is influenced by a variety of factors depending on source.

Waters from the region's imported sources, the Colorado River and State Water Project, are vulnerable to a number of contributors to water quality degradation. High salinity

concentrations (also referred to as TDS), uranium, and perchlorate contamination are the primary areas of concern in Colorado River water quality. The key water quality issues for the State Water Project are disinfection byproduct precursors, in particular TOC, bromide, and low alkalinity.

Regional surface water and groundwater quality is vulnerable to increasing urbanization in the watershed, agriculture, recreational uses, invasive species, and fires. Historically, regional surface water quality has been considered good to excellent. Water quality can vary with imported water inflows and surface water contamination. While many local surface water supplies remain good quality, some local supplies are lower quality; poor quality water results in higher treatment costs and challenges to downstream utilities, who must reliably treat water to meet drinking water standards.

Source water protection is also considered a key element to regional water quality. The Water Authority and its member agencies work together to improve watershed awareness and management.

ES.8 Integrated Regional Water Management Planning

Integrated Regional Water Management (IRWM) planning involves coordinating and integrating water planning activities in a defined region to improve and maintain a region's water supply reliability and water quality. IRWM planning recognizes that water supplies, water quality and natural resources are connected, and as such, focuses on projects that produce multiple benefits in those areas.

In 2005, the Water Authority, the City of San Diego, and the County joined to form the Regional Water Management Group (RWMG) for the San Diego IRWM planning region. San Diego's first *San Diego Integrated Regional Water Management Plan* (IRWM Plan) was published in 2007 and subsequently updated in 2013 and 2019. The region has successfully pursued state grant funding for projects that help to achieve goals established through IRWM planning efforts. Since 2008, DWR has awarded nine IRWM grants totaling \$111.7 million to the San Diego IRWM planning region for high priority water resource management projects.

ES.9 Water Supply Reliability

The 2020 UWMP presents the Water Authority's water reliability assessments from 2025 through 2045. Consistent with the UWMP Act requirements, each assessment compares total projected water supply and demands over the next 20 years in five-year increments under the following scenarios:

- Normal water year
- Single dry-year
- Multiple dry-year

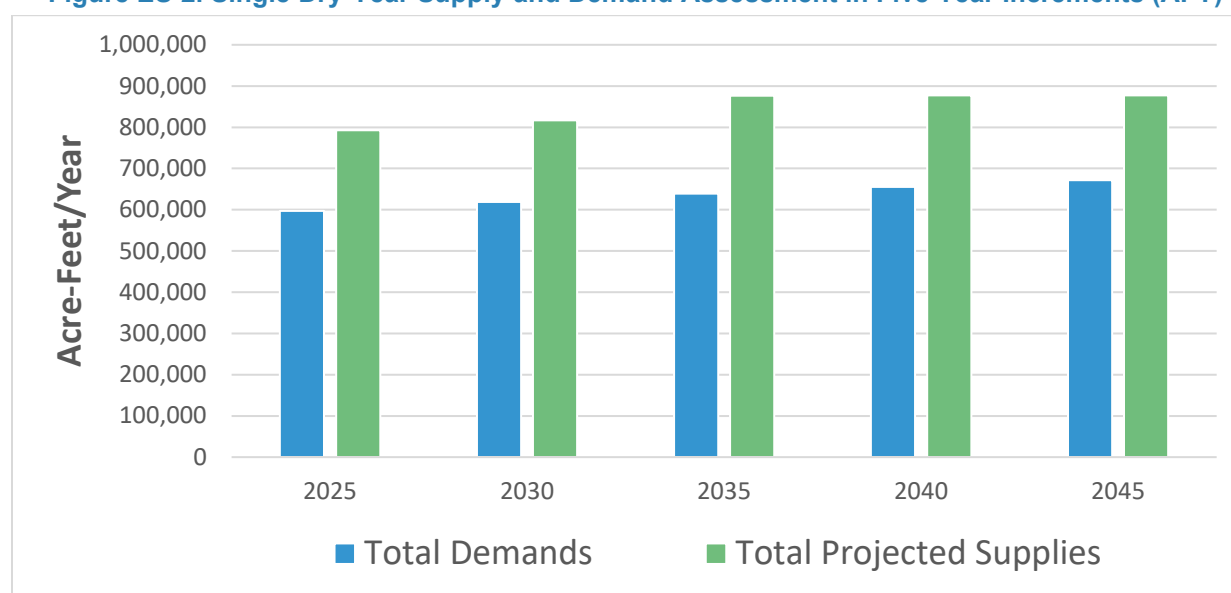
The reliability assessment results demonstrate that, even when making conservative assumptions about the availability of dry year supplies from Metropolitan, the San Diego region's water resource mix is drought resilient.

ES.9.1 Single Dry-Year Water Supply and Demand Assessment

Under the single dry-year scenario, the projected groundwater and surface water yields are based on 2015 dry-year supplies. Member agency projected verifiable supplies for recycling, potable reuse, seawater desalination, groundwater recovery, and water transfers are assumed to experience little, if any, reduction in a dry year. Water Authority conserved supplies from the Imperial Irrigation District transfer, canal lining projects, and Carlsbad Desalination Plant are also considered drought-resilient. With a conservative assumption regarding limited Metropolitan supplies during a single dry-year, Water Authority and member agency supplies maintained and developed as planned, and achievement of the additional conservation target, no shortages are anticipated in the Water Authority's service area under a projected single dry-year.

Figure ES-2 shows the single dry-year water year assessment, summarizing total water demands in the Water Authority's service area through 2045, along with the supplies projected to meet demand under single dry-year conditions.

Figure ES-2. Single Dry-Year Supply and Demand Assessment in Five Year Increments (AFY)

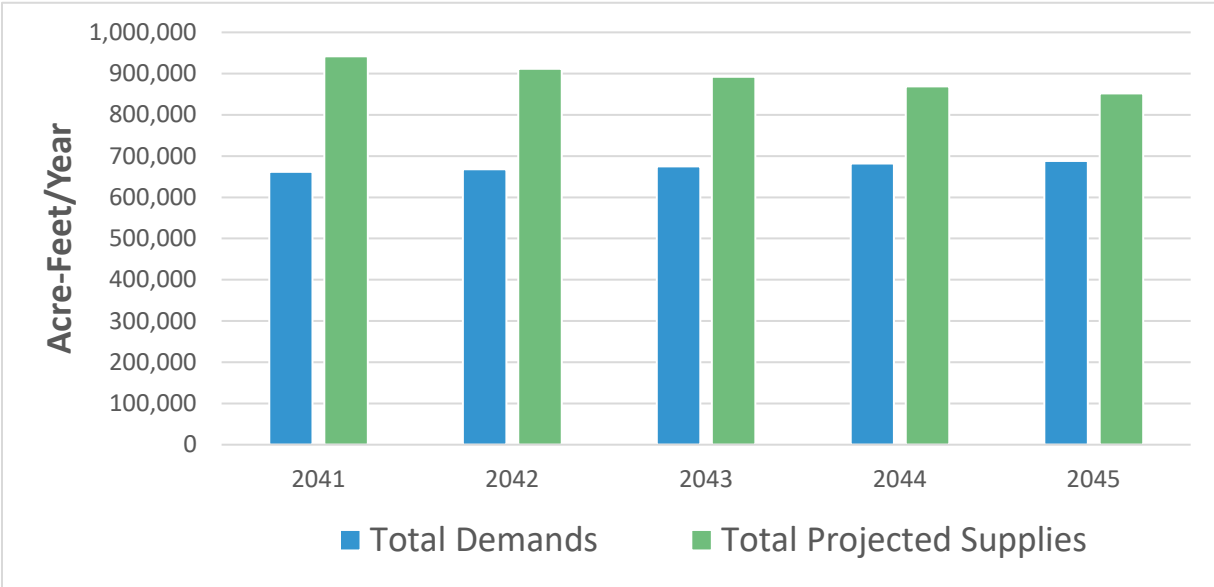


ES.9.2 Multiple Dry-Year Water Supply and Demand Assessment

Under the multiple dry-year scenario, seawater desalination and San Luis Rey water transfer supplies are based on contractual levels; recycled, brackish groundwater, and potable reuse yields are based on member agency projected growth in these verifiable supplies; and surface and groundwater yields are based on 2011-2015 water use levels. It was conservatively assumed that Metropolitan would allocate supplies to its member agencies.

Figure ES-3 shows the multiple dry-year water year assessment for 2041-2045, summarizing total water demands in the Water Authority's service area through 2045, along with the supplies projected to meet demand under multiple dry-year conditions. Similar assessments were completed for multiple dry-year periods ending in each 5-year increment from 2025 to 2040 and also show sufficient supplies to meet projected demands.

Figure ES-3. 2041–2045 Multiple Dry Water-Year Supply and Demand Assessment (AFY)



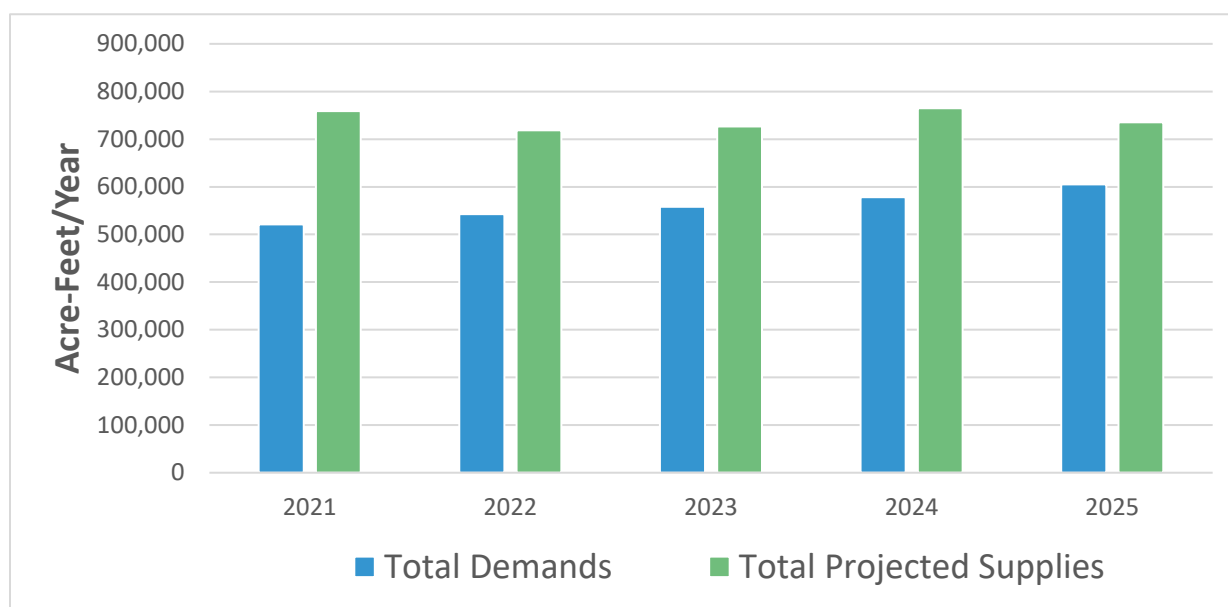
ES.9.3 Drought Risk Assessment

The UWMP Act requires a water supplier to include in its 2020 UWMP a drought risk assessment (DRA). The Water Authority's DRA assesses a projected drought over the next five-year period from 2021 – 2025, as shown in Figure ES-4.

The historical period used in the analysis to represent the Water Authority's driest consecutive five-year period are years 2014 – 2018. Those years represent the five-year period with the lowest local water supply production from surface water and groundwater, the two local water supplies that are most susceptible to variation due to weather. Over that period, the combined annual production from those sources ranged from a high of 67,374 AF to a low of 21,245 AF.

The demands for 2021 – 2025 were projected by taking estimated CY 2020 demands of 482,624 AF and escalating them annually for five years based on the multipliers developed to assess the impact of dry/hot weather on water demands. The multipliers result in a sizable increase in 2021 water demand and incremental increases in demands over the remaining four years. This allows for a robust assessment of the Water Authority's ability to meet dry-year demands over the projected five-year period.

Figure ES-4. 2021 – 2025 Drought Risk Assessment (AFY)



ES.10 Scenario Planning – Managing an Uncertain Future

The UWMP Act requires that for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, the agency must describe to the extent practicable, plans to replace that source with alternative water sources or water demand management measures.

To adequately assess the reliability of the San Diego region’s future resource mix and plan for any potential uncertainties regarding water supply sources, this 2020 UWMP incorporates a traditional scenario-based planning process. This process assesses potential risks associated with implementation of projected resource mixes and identifies management strategies to help address potential uncertainty. Critical uncertainties surrounding implementation of the mix were identified and evaluated. The Water Authority’s five potential scenarios developed based on supply uncertainties are listed in Table ES-1.

Table ES-1. Future Potential Scenarios Identified for Planning Purposes

Future Potential Scenarios Identified for Planning Purposes	
1	Drought
2	Drought with Further Limitations on Metropolitan Supplies
3	Drought with Limited Metropolitan Supplies and Member Agency Local Supplies
4	Demographic Shift
5	Climate Change

The scenario planning process includes the establishment of key tracking metrics to evaluate the status of supply sources in the projected resource mix. These metrics are used to determine whether adaptive management strategies are required to ensure continued reliability. The Water Authority and its member agencies can help ensure a long-term reliable water supply for the region through the following measures:

1. Continue to implement the diverse resource mix identified in this 2020 UWMP, including continued water-use efficiency measures
2. Continue to implement additional planned local projects, with a priority on member agency projects, that will strengthen implementation of the projected resource mix, continue to reduce reliance on Metropolitan supply sources, and manage potential shortfalls, if any, in development of supplies identified in the resource mix
3. Conduct annual tracking and reporting on implementation of the mix that will allow the Water Authority and its member agencies to adjust based on actual supply availability and conditions, and take appropriate action if necessary if supplies in the resource mix are not developed as planned

ES.11 Water Shortage and Drought Planning

Section ES.11 discusses potential actions the Water Authority could take to address supply shortages due to a catastrophe, drought, or other situations. It also highlights elements of the Water Authority's Water Shortage Contingency Plan (WSCP), including actions to be taken in response to various water shortage levels and the process to perform an annual water supply and demand assessment.

The WSCP serves as the San Diego region's guiding shortage management document and includes information on the history of the Water Authority's drought planning documents, the process to prepare an annual water supply and demand assessment, the shortage supply matrix and response level triggers, the supply allocation methodology, and model drought response ordinance.

Table ES-2 provides a summary of the Water Authority's WSCP and Model Drought Ordinance shortage levels.

Table ES-2. WSCP and Model Drought Ordinance Shortage Levels

WSCP and Model Drought Ordinance Shortage Levels	Use Restrictions	Conservation Target
1	Voluntary	Up to 10%
2	Mandatory	Up to 20%
3	Mandatory	Up to 30%
4	Mandatory	Up to 40%
5	Mandatory	Up to 50%
6	Mandatory	Above 50%

The WSCP also discusses how the Water Authority would respond to a catastrophic event, such as an earthquake, that results in insufficient water to meet the region's needs or eliminates access to imported water supplies. The Water Authority's Integrated Contingency Plan (ICP) and Emergency Storage Project (ESP) were developed to protect public health and safety and to prevent or limit economic damage that could occur from a severe shortage of water supplies.

In the event of a severe shortage of water supplies, the Water Authority has taken significant steps to reduce potential revenue impacts resulting from fluctuating water sales. In fiscal year 1990, the Water Authority created a rate stabilization fund to mitigate the need for rate increases in the event of an unexpected decline in water sales. The rate stabilization fund provides an important tool to mitigate water sales volatility and the impact that has on water rates. The complete WSCP can be found in Appendix E.

SECTION 1 INTRODUCTION

The San Diego County Water Authority (Water Authority) has prepared this *2020 Urban Water Management Plan* (2020 UWMP) in accordance and compliance with the Urban Water Management Planning Act (UWMP Act) (Water Code Sections 10610 through 10656) and includes the conservation measures, programs and policies required by Water Code Section 10608.36.

Urban water suppliers are required by the UWMP Act to update their UWMP and submit a complete version to DWR every five years. The Water Authority's 2020 UWMP serves as the long-term planning document that will help to ensure a reliable water supply for the region. New for the 2020 UWMP are the following requirements:

- Inclusion of an adopted water shortage contingency plan that will also serve as a stand-alone document that can be updated more frequently than every five years (*Appendix E Water Shortage Contingency Plan*)
- Annual submittal of the water supply and demand assessment to DWR and inclusion in the UWMP of the assessment methodology used to compare available water supplies to projected water demands
- Planning for a dry period that lasts for five consecutive years
- Preparation and inclusion of a Drought Risk Assessment
- Reporting of energy intensity associated with the Water Authority's sources of water, included in *Appendix I Water Authority's Energy Intensity Calculations*

The Water Authority's mission is to provide a safe and reliable supply of water to its member agencies serving the San Diego region. The 2020 UWMP identifies a diverse mix of water resources projected to be developed over the next 25 years to ensure long-term water supply reliability for the region.

Since adopting the *2015 Urban Water Management Plan* (2015 UWMP), the Water Authority and its member agencies have made great strides in developing a more drought-resilient mix of water resources, thereby increasing the region's ability to manage and avoid shortage situations. In partnership, and with the support of its member agencies, the Water Authority's programs and initiatives cumulatively have conserved more than 1 million AF of water since 1991. Per capita potable water use in the San Diego region has decreased 50% between fiscal year 1990 and fiscal year 2020. In addition, the Water Authority's member agencies continue to evaluate, plan, and implement local supply development through recycled water, brackish groundwater recovery, potable reuse, seawater desalination, and water transfers. In this 2020 UWMP, the next increment of supply to reduce reliance on imported sources and ensure drought-resilient supplies is expected to emanate from their efforts.

It should be noted that in March 2020, the Fallbrook Public Utility District and the Rainbow Municipal Water District filed applications with the San Diego County Local Agency Formation Commission (LAFCO) to detach from the Water Authority and to annex into, and be a wholesale member of, the Eastern Municipal Water District. The results of these applications are not yet known and may take many months or years for resolution, and so the 2020 UWMP has assumed that the two agencies will remain Water Authority member agencies for purposes of the 2020 UWMP. Once the result of the LAFCO process is final, then the Water Authority will take any necessary actions to update the data in the 2020 UWMP.

1.1 California Urban Water Management Planning Act

The UWMP Act requires all urban water suppliers in California to prepare UWMPs and update them every five years. The Water Authority used DWR's *2020 Urban Water Management Plans Guidebook for Urban Water Suppliers* in preparation of this 2020 UWMP (DWR, 2020).

Major amendments made to the UWMP Act since preparation of the Water Authority's 2015 UWMP include the following:

- *2020 UWMP Submittal Date* – Water Code Section 10621(f) changed the deadline for water suppliers to submit their 2020 UWMPs that are now due to DWR by July 1, 2021.
- *Five Consecutive Dry-Year Water Reliability Assessment* – Water Code Sections 10631(b) and 10635 modified the dry-year water reliability planning from a “multi-year” time period to a “drought lasting at least five years” designation. This statutory change requires an urban water supplier to analyze the reliability of its water supplies to meet its water use over an extended drought period.
- *Drought Risk Assessment* – Water Code Sections 10612 and 10635 created a new UWMP requirement for drought planning in part because of the significant duration of recent California droughts and the predictions about hydrological variability under climate change. The Drought Risk Assessment (DRA) requires an urban water supplier to assess water supply reliability based on the “driest five-year historic sequence for the agency’s water supply” for years 2021 to 2025.
- *Seismic Risk* – Water Code Section 10632.5 now requires urban water suppliers to specifically address seismic risk to various water system facilities and to have a mitigation plan. Suppliers may comply with this new requirement by submitting a copy of the most recently adopted local multihazard mitigation plan if the plan addresses seismic risk.
- *Water Shortage Contingency Plan* – In 2018, the State Legislature modified Water Code Section 10632 to require a Water Shortage Contingency Plan (WSCP) with specific elements. The WSCP is a document that provides an urban water supplier with an action plan for a drought or catastrophic water supply shortage. Many of these actions were implemented by suppliers during the last drought to successfully meet changing local water supply challenges.

- *Groundwater Supplies Coordination* – In 2014, the State Legislature enacted the Sustainable Groundwater Management Act to address groundwater conditions throughout California. Water Code Section 10631(b) now requires 2020 UWMPs to be consistent with Groundwater Sustainability Plans, in areas where those plans have been completed by Groundwater Sustainability Agencies.
- *Lay Description* – Water Code Section 10630.5 is a new statutory requirement to include a lay description of the fundamental determinations of the UWMP, especially regarding water service reliability, challenges ahead, and strategies for managing reliability risks. This section of the UWMP could be viewed as a go-to synopsis for new staff, new governing members, customers, and the media, and it can ensure a consistent representation of the detailed analysis.

Several additional regulations that aren't located within the UWMP Act, but may affect the contents of 2020 UWMPs and future updates, follow:

- *Bay-Delta Reliance* – California Code of Regulations, Title 23, Section 5003 requires implementation of Policy WR P1: Reduce Reliance on the Delta Through Improved Regional Water Reliance in *The Delta Plan* (Delta Stewardship Council, 2013). In the 2020 Guidebook (DWR, 2020), DWR recommends that any urban water supplier receiving water from the Sacramento-San Joaquin Bay-Delta (Bay-Delta) include voluntary information in their 2020 UWMP to demonstrate compliance with Policy WR P1. Guidance is provided by DWR in its 2020 Guidebook, Appendix C.
- *Urban Water Use Objectives and Water Use Reporting* – Water Code Sections 10609 – 10609.38 details the timeline and requirements for the State Water Resources Control Board (SWRCB), in collaboration with DWR, to establish new urban water use objectives for urban water suppliers and then requires annual reporting on compliance with those objectives. As the water use objectives will not be available until June 2022, this 2020 UWMP does not address these requirements.

Appendix A includes text changes made to the UWMP Act (Including changes related to the water reliability assessment, Drought Risk Assessment, and WSCP requirements).

1.2 Water Conservation Legislation

In November 2009, the California State Legislature passed Senate Bill 7 as part of the Seventh Extraordinary Session (Senate Bill X7-7), which became effective February 3, 2010. This law was the water conservation component to the Bay-Delta legislation package, and sought to achieve a 20% statewide reduction in urban per capita water use in California by December 31, 2020. The law required each urban retail water supplier to develop urban water-use targets to help meet the 20% goal by 2020.

Wholesale water suppliers must include in their 2020 UWMPs an assessment of their present and proposed future measures, programs and policies to help retail agencies achieve their water-use reduction targets (per Water Code Section 10608.36). The Water Authority has assisted its member agencies through the implementation of various conservation incentive and education program detailed in *Section 3 Demand Management*. The Senate Bill X7-7

potable demand target calculated for member agencies in 2020 was 619,323 acre-feet (AF), and actual potable water use was 457,964 AF.

In 2018, new conservation legislation was signed into law. Senate Bill 606 and Assembly Bill 1668 created a framework that directed DWR and the SWRCB to develop and adopt long term water efficiency targets to exceed 20 x 2020 water savings by 2027. Each retail supplier across the state will have a water use target based on efficiency standards for indoor residential water use, landscape irrigation and water loss. These targets are currently being developed and projected to be adopted in 2022. Retail water suppliers will be required to meet demand targets by 2027 or face penalties set by the SWRCB. Water Authority staff is working with state agencies to develop targets and will assist member agencies in calculating and meeting targets.

1.3 Senate Bills 610 and 221

Water Code Sections 10910 through 10914 (Senate Bill 610) and Government Code Sections 65867.5, 66455.3, and 66473.7 (Senate Bill 221) amended California law to improve the link between information about water supply availability and certain land use decisions made by cities and counties. Senate Bill 610 requires the purveyor of a public water system to prepare a water supply assessment to be included in the environmental documentation of certain large, proposed projects. Senate Bill 221 requires affirmative written verification from the water purveyor of a public water system that sufficient water supplies are available for certain large residential subdivisions of property prior to approval of a tentative map.

Section 4 San Diego County Water Authority Supplies, and Appendix D Documentation of Water Authority Supplies, contain documentation about the existing and planned water supplies being developed by the Water Authority. This documentation may be used by the Water Authority's member agencies in preparing water supply assessments and written verifications required by state law. Specific documentation about member agency supplies and the Metropolitan Water District of Southern California's (Metropolitan's) supplies may be found in their respective plans.

1.4 Water Authority's 2020 UWMP Preparation and Implementation

To adequately demonstrate regional water supply reliability over the next 25 years, the 2020 UWMP quantifies the regional mix of existing and projected local and imported supplies necessary to meet future retail demands within the Water Authority's service area. Although the 2020 UWMP includes specific documentation regarding development of the Water Authority's supplies, the UWMPs submitted by the member agencies and Metropolitan will provide details about their respective supplies that contribute to the diversification and reliability of supplies for the San Diego region. Data included in the 2020 UWMP is provided on a calendar year (CY) basis, unless noted otherwise.

Reasonable consistency among Metropolitan, the Water Authority, and the Water Authority's member agency UWMPs is important for accurately identifying projected supplies available to meet regional demands. To facilitate coordination in the Water Authority's service area, the Water Authority formed an UWMP Working Group made up of staff from the Water Authority and its member agencies. The UWMP Working Group provided a forum for exchanging demand and local supply information. In addition, Water Authority staff participated in Metropolitan's Regional Urban Water Management Plan member agency coordination meetings to discuss and share information about demands and supplies within their respective service areas. Water Authority staff served on a 2020 UWMP Guidebook Workgroup coordinated by DWR prior to the release of the Draft 2020 Guidebook, which met in March and June 2020. The Water Authority also participated in a DWR hosted webinar in September 2020 on the Draft Guidebook release, as well as multiple topical webinars in November and December 2020 to review the requirements of the UWMP Act.

An administrative draft of the 2020 UWMP was distributed to the Water Authority's member agencies for technical review in January 2021, and comments were incorporated into the public review draft of this 2020 UWMP prior to release. Providing member agencies with an administrative draft 2020 UWMP, which included water supply projections, satisfies Water Code Section 10631(j).

In accordance with the UWMP Act, the Water Authority notified the land use jurisdictions within its service area 60 days prior to a public hearing that it was preparing the 2020 UWMP (per Water Code Section 10635(b)). In addition, the Water Authority encouraged active involvement in its service area prior to and during preparation of the draft 2020 UWMP (per Water Code Section 10642). The public review draft of the 2020 UWMP was distributed to the Water Authority Board of Directors (Board) and for public review and comment on March 8, 2021. The draft 2020 UWMP was available on the Water Authority's website at: www.sdcwa.org. The deadline for receipt of comments on the draft 2020 UWMP was May 6, 2021. A public hearing to receive comments on the draft 2020 UWMP was held on March 25, 2021. Notice of the Public Hearing was published in two separate issues of the *San Diego Union-Tribune*, the newspaper designated by the Water Authority for publications of notices, as required by Government Code Section 6066 and Water Code Section 10642. The Water Authority reviewed all the comments received and revised the plan accordingly. On May 27, 2021, the Board adopted the 2020 UWMP. The Water Authority submitted an electronic copy of the adopted 2020 UWMP to DWR by July 1, 2021 (per Water Code Section 10621(d) and Water Code Section 10644(a)(2)). A copy of the adopted 2020 UWMP was also submitted to the California State Library, the County of San Diego (County), and the cities in the Water Authority's service area within 30 days of adoption (per Water Code Section 10644(a)(1)). The Water Authority's adopted Water Shortage Contingency Plan is included as Appendix E of the 2020 UWMP, and was made available concurrently with the 2020 UWMP (Water Code Section 10635(c)). Per Water Code Section 10645(b), the Water Shortage Contingency Plan has been made available to the public on the Water Authority's website (www.sdcwa.org) and is included

as Appendix E of the UWMP. In addition, a copy of the adopted 2020 UWMP is available for review at the Water Authority's office during normal business hours, and a copy of the adopted plan has been posted on the Water Authority's website at www.sdcwa.org (per Water Code Section 10645). A copy of the resolution adopting the 2020 UWMP, along with copies of notifications, mailing lists, and other Water Authority 2020 UWMP implementation documents, is in *Appendix B Water Authority 2020 UWMP Implementation Documents*.

DWR prepared a checklist of items based on the UWMP Act that must be addressed in an agency's plan. This checklist allows an agency to identify where in its plan it has addressed each item. The Water Authority has completed the checklist, referencing the sections and appendices included in the 2020 UWMP (*Appendix C DWR 2020 UWMP Checklist*).

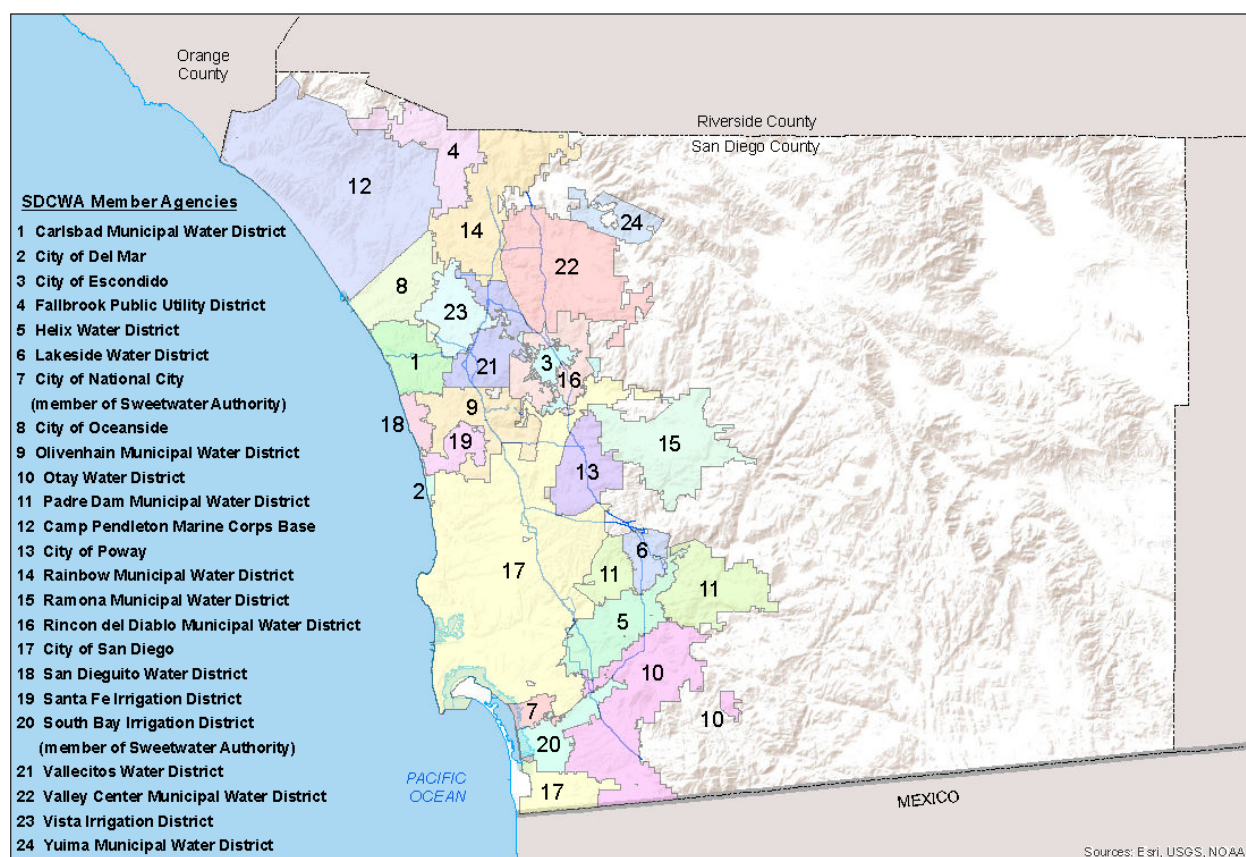
1.5 History and Description of the Water Authority

The Water Authority was established in 1944 pursuant to legislation adopted by the California State Legislature in 1943 to provide a supplemental supply of water as the San Diego region's civilian and military population expanded to respond to the war effort. Because of a strong military presence, the federal government arranged for supplemental supplies from the Colorado River in the 1940s. In 1947, water began to be imported from the Colorado River via a single pipeline that connected to Metropolitan's Colorado River Aqueduct (CRA) in Riverside County. To meet the water demands of a growing population and economy, the Water Authority constructed four additional pipelines between the 1950s and early 1980s that are all connected to Metropolitan's distribution system and deliver water to the County. The Water Authority is now the county's predominant source of water, supplying from 75% to 95% of the region's needs, depending upon weather conditions, and yield/production from surface supplies, as well as recycled, groundwater, and desalination projects.

The Water Authority's 24 member agencies purchase water from the Water Authority for retail distribution in their service territories. A 36-member Board consisting of member agency representatives governs the Water Authority. The member agencies' six cities, five water districts, eight municipal water districts, three irrigation districts, public utility district, and federal military reservation have diverse and varying water needs.

In terms of land area, the City of San Diego is the largest member agency at 210,726 acres. The smallest member agency is the City of Del Mar at 1,159 acres. Some member agencies, such as the cities of National City and Del Mar, use water almost entirely for municipal and industrial purposes. Others, including Valley Center, Rainbow, and Yuima Municipal Water Districts (MWDs), deliver water that is used mostly for agricultural production.

Figure 1-1. Water Authority Service Area and Member Agencies



1.6 Water Authority Physical Water Delivery System

The Water Authority was organized for the primary purpose of supplying imported water to the County for wholesale distribution to its member agencies. These imported water supplies consist of water purchases from Metropolitan, core water transfers from Imperial Irrigation District (IID) and canal lining projects that are wheeled through Metropolitan's conveyance facilities, and spot water transfers that are pursued on an as-needed basis to offset reductions in supplies from Metropolitan. The largest single year of imported water sales recorded by the Water Authority was approximately 661,000 AF in fiscal year 2007.

Since December 2015, the Water Authority has begun delivering regional supplies from the Carlsbad Desalination Plant (refer to *Section 4.5 Carlsbad Desalination Plant*). The Water Authority takes delivery of desalinated water at the Carlsbad Desalination Plant. A 10-mile-long pipeline delivers water from the plant to the Water Authority's Second Aqueduct. The Second Aqueduct conveys desalinated water to the Water Authority's Twin Oaks Valley Water Treatment Plant (WTP), where it is mixed with existing drinking water supplies for regional distribution.

1.6.1 Aqueduct System

Imported water supplies are delivered to the Water Authority member agencies through a system of large-diameter pipelines, pumping stations, and reservoirs. The pipelines that deliver supplies from Metropolitan are divided into two aqueduct alignments, both of which originate at Lake Skinner in southern Riverside County and run from north to south through the Water Authority's service area. Metropolitan's ownership of these pipelines extends to a "delivery point" six miles into the County. From there, Pipelines 1 and 2 compose the First San Diego Aqueduct, which reaches from the delivery point to San Vicente Reservoir. These two pipelines share five common tunnels and operate as a single unit to provide 180 cubic feet per second (cfs) of conveyance capacity.

Pipelines 3, 4, and 5 form the Second San Diego Aqueduct. These pipelines, which are located several miles to the west of the First San Diego Aqueduct, have delivery point capacities as follows:

- Pipeline 3 provides 280 cfs
- Pipeline 4 provides 470 cfs
- Pipeline 5 provides 500 cfs

In addition to the above north-south pipelines, there are several east-west pipelines that extend service to multiple member agencies. Table 1-1 lists the pipelines owned and operated by the Water Authority; Figure 1-1 (above) shows pipeline locations.

Table 1-1. Water Authority Pipelines

Pipelines	Length (miles)	Diameter (inches)
First San Diego Aqueduct		
La Mesa-Sweetwater Extension	16.5	18–42
Pipeline 1 and Pipeline 2	68.1	48–72
Moreno-Lakeside Pipeline	4.8	54–60
Second San Diego Aqueduct		
Tri-Agencies Branch Pipeline (San Marcos to Oceanside)	4.4	21–42
Ramona Pipeline	7.9	36–57
Carlsbad Desal Conveyance Pipeline	10	54
Crossover Pipeline (San Marcos at Twin Oaks to Escondido at Hubbard Hill)	7.6	66
Valley Center Pipeline	4.1	66
Pipeline 3	59.2	66–75
Pipeline 4	44.9	69–96
Pipeline 4B	9.9	96–108
Pipeline 4E	19.6	72–108
North County Distribution Pipeline	3.5	72
Olivenhain Pipeline	2.6	78
Pipeline 5	11.2	96
Pipeline 5E	21.8	108
San Vicente Pipeline and Aqueduct Interconnect	12.7	102
Olivenhain-Hodges Interconnect Pipeline	1.2	121
Total:	310.0	

Although most water is conveyed by gravity in the aqueduct system, the Water Authority also maintains several pumping stations that enhance the pipeline system’s operational flexibility to meet daily, seasonal, and emergency needs.

Table 1-2 lists Water Authority-owned pump stations.

Table 1-2. Water Authority Pump Stations

Pump Station	Capacity (cfs)
Escondido Pump Station	20
Valley Center Pump Station (Treated)	41
Miramar Pump Station (Treated)	60
Twin Oaks Pump Station (ESP)	156
Olivenhain Pump Station (ESP)	314
San Vicente Pump Station (ESP)	444
Olivenhain-Hodges Pumped Storage (ESP)	760

The Emergency Storage Project (ESP) pump stations are for untreated water and are sized to protect the region from potential disruptions of imported water supplies. If a supply disruption occurs, the untreated water pump stations will deliver emergency water supplies from newly expanded or existing local storage reservoirs. For more information about the Water Authority's emergency facilities and ESP, refer to *Section 11.2.2 Emergency Storage Project*.

At other times, Water Authority-owned pumping stations also provide operational flexibility in non-emergency situations to use previously stored water to supplement daily demands.

1.6.2 Storage Facilities

The Water Authority uses storage facilities to both manage daily operations and provide water reserves in response to seasonal, drought, and emergency storage needs. System Regulatory Storage facilities, which consist of enclosed reinforced concrete storage tanks, are available to manage the daily balance of treated and untreated water deliveries. System Regulatory Storage in the aqueduct system currently totals 56 million gallons, with the bulk of this amount being held in storage tanks in Twin Oaks Valley and Mission Trail Regional Park.

Water Authority seasonal, drought, and emergency storage capacity currently includes 24,774 AF of in-region surface water storage at the Olivenhain Reservoir, 157,100 AF at the San Vicente Dam, and 70,000 AF of out-of-region leased groundwater storage in the San Joaquin Valley. Groundwater storage includes 30,000 AF of storage and capacity rights acquired in June 2008 in the Semitropic Water Bank, and 40,000 AF of storage provided by the Semitropic-Rosamond Water Bank Authority that was acquired in August 2008. Refer to *Section 5.2.1 Surface Water Description* for specific information about the ESP and the Carryover Storage Project (CSP).

1.6.3 Water Treatment

The Water Authority owns the 100-million gallon per day (MGD) Twin Oaks Valley WTP and has agreements with the Helix Water District securing 36 MGD of treatment capacity from the R.M. Levy WTP. Water from the R.M. Levy WTP supplements treated water service to eastern

San Diego County. The balance of treated water supplies comes from water treatment plants owned and operated by Water Authority member agencies. Table 1-3 lists all in-region WTPs.

In 2012, the Water Authority entered into a formal Water Purchase Agreement with Poseidon Water LLC (Poseidon Water) detailing commercial and financial terms for the purchase of desalinated ocean water produced at the Carlsbad Desalination Plant and delivered to the Water Authority's regional aqueduct system. The Carlsbad Desalination Plant became operational in 2015 and provides, on average, about 50 MGD of high-quality drinking water.

Table 1-3. In-Region Treatment Plant Capacity

Member Agency	Water Treatment Plant	Capacity (MGD)
Escondido, City of/Vista Irrigation District	Escondido/Vista	75
Helix Water District	Levy	106
Olivenhain Municipal Water District	Olivenhain	34
Oceanside, City of	Weese	25
Poway, City of	Berglund	24
Ramona Municipal Water District	Barger (offline at this time)	5 *
San Diego, City of	Alvarado	150
San Diego, City of	Miramar	140
San Diego, City of	Lower Otay	34
San Diego County Water Authority	Twin Oaks Valley	100
San Diego County Water Authority	Claude "Bud" Lewis Carlsbad Desalination	54
San Dieguito WD/Santa Fe Irrigation District	Badger	40
Sweetwater Authority	Perdue	30
Total In-Region Treatment Plant Capacity*		812 *

*Note: Ramona Municipal Water District's Barger Water Treatment Plant, with a capacity of 5 MGD, is offline at this time, and is not included in the total in-region treatment plant capacity.

1.6.4 Capital Improvement Program

The Water Authority's Capital Improvement Program (CIP) can trace its beginnings to a 1989 report approved by the Water Authority Board (Board) entitled *The Water Distribution Plan, a Capital Improvement Program through the Year 2010 (Water Distribution Plan)* (Water Authority Board, 1989). The Water Distribution Plan included 10 projects designed to increase the capacity of the aqueduct system, increase the yield from existing water treatment plants, obtain additional supplies from Metropolitan, and increase the reliability and flexibility of the aqueduct system. Since that time, the Water Authority has made numerous additions to the list of projects included in its CIP as the region's infrastructure needs and water supply outlook have changed.

The current list of projects included in the CIP is based on the results of planning studies, including the 2015 UWMP (Water Authority, 2016) and the *2013 Regional Water Facilities Optimization and Master Plan Update* (Master Plan Update) (Water Authority, 2013). These CIP projects, which are most recently described in the Water Authority's *General Manager's Adopted Multi-Year Budget, Fiscal Years 2020 and 2021* (Water Authority, 2020a), include 34 projects valued at \$1.99 billion. These 34 CIP projects are designed to meet projected water supply and delivery needs of the member agencies through 2035. These CIP projects are grouped into the following categories:

- *Asset Management* — The Water Authority's emphasis has transitioned from a large-scale capital-intensive program to an operations-based organization with a focus on effective asset management. The primary components of asset management projects include the relining and replacement of existing pipelines, and infrastructure rehabilitation of aging facilities.
- *New Facilities* — These projects include completion of new facilities to diversify the Water Authority's source of water for the region (e.g., the Carlsbad Desalination Plant and Colorado River Canal Lining and Water Transfer Mitigation) as well as new facilities that enhance operations of the Water Authority's existing aqueduct system.
- *Emergency Storage Program* — These projects include improvements to both the First and Second Aqueducts in north San Diego County, are required to address delivery capabilities related to the ESP, and include the ESP–North County Pump Stations, ESP–Post Construction Activities, and ESP–Owner Controlled Insurance Program Closeout.
- *Master Planning and Studies* — These are near-term projects are identified in the Master Plan Update and are added to the CIP for further study to address the following:
 - Addressing untreated water capacity constraints and operational flexibility
 - Building out the final ESP phase (including upgrades to the San Vicente Pump Station to add a third pump drive and additional power)
 - Adding system isolation valves for more efficient operation of the aqueduct system
 - Performing various planning studies study to explore potential energy production projects
- *Other* — These projects include the following:
 - Implementing the Mitigation Program that will provide coordinated permitting and mitigation for environmental impacts resulting from the construction, operation, and maintenance of CIP projects
 - Replacing the Water Authority's Headquarters building roof
 - Implementing a new water billing system
- *Long Range Forecast Projects* — These projects are those outside of the Water Authority's current planning horizon window.

As a result of the Water Authority's Asset Management Program inspection and monitoring, CIP prioritization, and other planning studies, the CIP is revised every two years as part of the biennial budget setting process.

1.6.5 Renewable Energy Resources

The Water Authority has long supported efforts to develop renewable energy resources that are compatible with water operations. This has included investments to improve operational effectiveness, reduce greenhouse gases (GHGs), and decrease Water Authority and member agency energy costs to help stabilize water rates. In June 2019, the Board adopted an updated Energy Management Policy (EMP) that focuses on the following six areas:

- Energy supplies
- Existing system operations
- New energy generation and storage
- Energy efficient equipment and features
- Collaborative relationships
- Government relations

The EMP establishes goals including reducing energy costs at the Carlsbad Desalination Plant, continuing progress on the proposed San Vicente Energy Storage Facility, and using existing and new infrastructure to generate revenues to offset water rates. This policy, in conjunction with the Water Authority's *Climate Action Plan* (Water Authority, 2020b) will also provide environmental benefits to the region by helping to reduce GHG emissions associated with energy.

Hydroelectric Facilities

The 4.5-megawatt Rancho Peñasquitos Hydro-generation and Pressure Control Facility generates 11,000 megawatt-hours of clean energy and renewable energy credits (RECs) annually. Improvements to the facility, which are expected to be complete in summer of 2022, will increase clean energy generation and RECs to 21,000 megawatt-hours. This has the potential to reduce GHGs by 10,370 metric tons of carbon dioxide equivalent (MTCO₂e).

The Lake Hodges Energy Storage Facility provides the region with 40 megawatts of energy storage, which helps to balance the energy grid and enhance system reliability. This is achieved by storing excess renewable energy during low-energy use periods and generating energy during high-use periods. Revenue from the facility helps to stabilize water rates.

Solar Facilities

To take advantage of the unique solar potential of Southern California, the Water Authority installed solar panels at the following three locations in 2011:

- Twin Oaks Valley WTP (4,844 panels)
- Kearny Mesa Headquarters (1,918 panels)
- Escondido Operations Center (742 panels)

These panels produce an estimated 2,500 megawatt-hours of electricity annually, accounting for 55% of the energy needs at Water Authority Headquarters, 38% of the energy needs at Escondido Operations Center, and 31% of energy needs at the Twin Oaks Valley WTP.

The solar energy systems were installed at no cost to the Water Authority through a 20-year contract with CleanCapital.¹ CleanCapital owns and operates the systems and sells the energy to the Water Authority at a reduced and fixed rate with an annual price escalation factor. Energy generated by these solar power systems reduces the Water Authority's energy costs, making agency operations more efficient for ratepayers. Combined, the systems are estimated to save \$3 million over 20 years.

1.7 Service Area Characteristics

Significant changes to the Water Authority's service area characteristics have occurred over the last several decades. Driven by an average annual population increase of 30,000 people per year, large swaths of rural land have been shifted to urban uses to accommodate population growth. This shift in land use has resulted in the region's prominent urban and suburban character.

Approximately one-third of the County of San Diego, by area, is developed (SANDAG, 2013). The majority of this developed land is located in the coastal urbanized region within the Water Authority's service area. An additional 13% of the County is vacant but could be developed, while the remaining 53% of the County's area is considered "constrained," meaning there are no opportunities for development due to geography or protected status. In general, the County is expected to develop an additional 130,000 acres between 2020 and 2050, with the majority (125,000 acres) of development dedicated to residential land uses. Of the developed land within the County, approximately 44% is residential. The portion of developed land that is residential is anticipated to increase from 44 to 50% by 2050, with the majority of the increase occurring in low-density single family (semi-rural residential) and multiple family zones. Many of the Water Authority's member agencies serving urbanized areas are anticipating greater growth in multiple family residential than in single-family residential. Approximately 10% of the County is paved roads and freeways, which have limited water demands, while 12% of the

¹ <https://cleancapital.com/>

County is dedicated to agricultural uses. Due to some conversion of agricultural land to other uses (primarily residential), agricultural lands are expected to decrease to approximately 10% of the developed area in the County. Parks and military use make up 25% of the County's current developed land, and while anticipated to grow by approximately 1,300 acres from 2020 to 2050, will represent only 22% of developed land by 2050 across the County.

The County also has a rich agricultural history, beginning with the establishment of large cattle ranches in the 18th century and continuing through the diverse range of crops and products grown today. Although the total number of agricultural acres under production has declined, the region maintains a significant number of high-value crops, such as cut flowers, ornamental trees and shrubs, nursery plants, avocados, and citrus. Based on the *State of the Food System in the San Diego Region – 2019 Report* (County of San Diego, 2019), the region has 5,082 farms — more than any other county in the nation. County agriculture represents \$1.8 billion in annual total sales and a total economic impact of \$2.8 billion. It ranks among the top counties statewide for production of nursery products, oranges, chickens, flowers and foliage, fresh-market tomatoes, lemons, avocados, eggs, mushrooms, and grapefruit. Additionally, San Diego county has the highest concentration of organic farmers in the United States with more than 350 U.S. Department of Agriculture Certified Organic growers.

1.7.1 Regional Economy and Demographics

The San Diego region's economy, as shown by the indicators referenced below, has improved considerably over the past few years and is predicted to be mostly positive by the San Diego Business Journal (County of San Diego, 2020). The Journal cautions that the economy could potentially slow and housing prices and cost of living would continue to be key challenges; but no recession is predicted. San Diego has a generally stable economy and was adding jobs prior to the emergence of COVID-19 (County of San Diego, 2020). The life sciences/biomedical and technology industries have been growing in the San Diego region. These, along with ongoing military/defense industry, have helped maintain a stable economy during the COVID-19 pandemic. Tourism, service/retail, and education are the industries that have been hit the hardest with respect to loss of revenue and job losses because of COVID-19 (County of San Diego, 2020 and The San Diego Tourism Authority, 2020). Gross regional production was estimated to grow 2% in 2020 from a Gross Regional Product of \$265 billion in 2019, and instead is down 4.7% (SANDAG, 2020).

According to the U.S. Census, the San Diego-Chula Vista-Carlsbad Metropolitan Area had a median household income of \$83,985 and a per capita income of \$40,389 in 2019 (US Census Bureau 2019). Approximately 40% of the population has a bachelor's degree or higher and 88% have a high school diploma or higher (U.S. Census Bureau, 2019). Approximately 10 to 14% of the population living within incorporated cities across the County live below the poverty line (San Diego North County Economic Development Council, 2020; South County Economic Council, 2017; and U.S. Census Bureau, 2019).

As of June 2020, the Case-Shiller Index of Home Prices for the San Diego area, which tracks changes in composite home prices over the previous five years, has remained in positive territory since mid-2015, posting steady increases every month from mid-2015 to November 2020. From November 2019 to November 2020, the index increased by 9.5%.

The San Diego region's job market continued to tighten prior to COVID-19, with the unemployment rate decreasing from 8.9% in September 2019 to 3.2% in February 2020. However, pandemic-related job losses resulted in an increase in the unemployment rate to 15% at the end of May 2020 (California Employment Development Department, 2020). Job losses were concentrated in a few sectors, including hospitality, retail, education, and health services. Other than these impacts from COVID-19, the region has posted strong gains in almost all sectors of the economy, most notably construction, business services, health care, hospitality, and manufacturing. Additionally, the life sciences/biomedical industry and the military/defense industry have made a very positive impact on maintaining employment during 2020.

San Diego's economy is, today, more diversified than ever. Key transportation links have been added to its urban transportation system, including expansion of its regional airport, Lindbergh Field. Three major campuses in the University of California and California State University system serve as springboards for urban development and biotech sector jobs growth. Meanwhile, San Diego's linchpin industry, military/defense, has maintained a large presence in the region with fully operational bases at Marine Corps Air Station Miramar, Naval Air Station North Island, Naval Base San Diego, and MCB Camp Pendleton. According to the U.S. Census (2019), over half of the San Diego region's housing stock is single family homes and approximately one-third is multi-family units. The median age in the region is 36 years, with the majority of the region's population between the ages of 18 to 64.

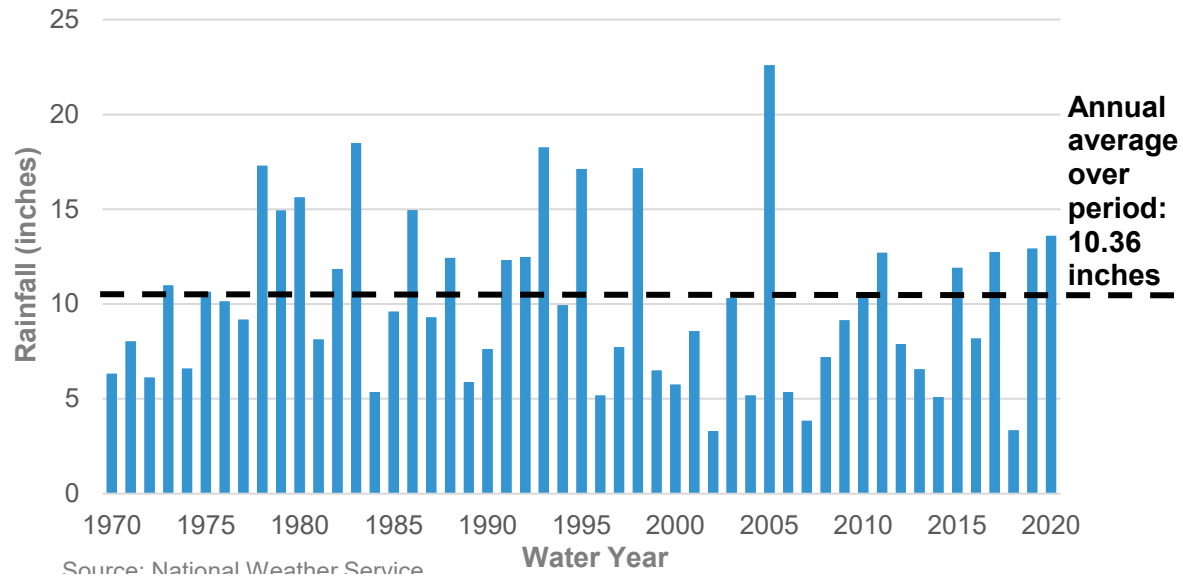
1.7.2 Climate

Climate within San Diego county is characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (°F) and winter temperatures occasionally dipping below freezing. Average annual rainfall is approximately 10 inches per year on the coast and in excess of 33 inches per year in the inland mountains. More than 80% of the region's rainfall occurs between December and March.

Variations in weather patterns affect regional short-term water requirements, causing reductions in water use during wet cycles and elevated demands during hot, dry periods. After a last multi-year drought, the region experienced above-average rainfall starting in 2017, and again in 2019 and 2020 (Figure 1-2). In April 2020, San Diego's Lindbergh Field received record-breaking rainfall (dating back to 1939) reaching a monthly total of 3.68 inches of rain, or 471% of average rainfall for the month. Additionally, prolonged above-average temperatures persisted in the San Diego area. Since January 2014, the region experienced one of the hottest

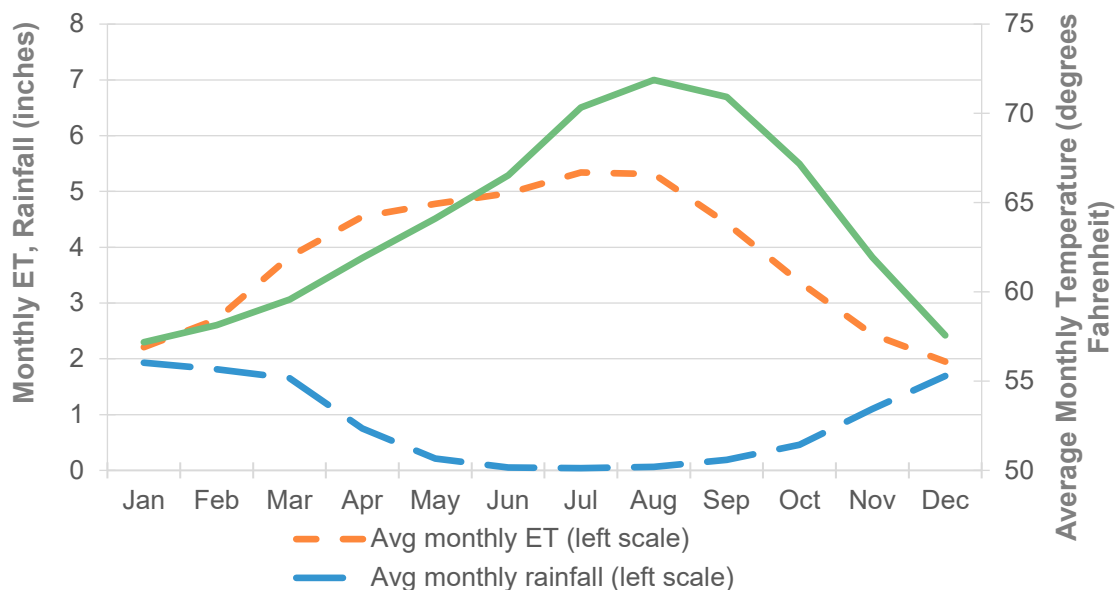
stretches on record, with above-average monthly high temperatures at Lindbergh Field for 72 of the 78 months at the end of fiscal year 2020.

Figure 1-2. Lindbergh Field Annual Rainfall, Water Years 1970 to 2020



Average monthly rainfall, temperatures and evapotranspiration for Lindbergh Field, San Diego's municipal airport located on its harbor, is shown in Figure 1-3. The graph shows how precipitation diminishes to near-zero during the peak irrigation-demand summer months.

Figure 1-3. Average Monthly Rainfall, Temperature, and Evapotranspiration at Lindbergh Field, CIMIS Station 184



Sources: California Irrigation Management Information System (CIMIS). Western Regional Climate Center.

1.7.3 Climate Change Research Efforts and Greenhouse Gas (GHG) Mitigation

This section provides an overview of the Water Authority’s efforts regarding studies and research on climate change, as well as GHG mitigation measures. The scenario planning process outlined in *Section 10, Scenario Planning*, entails adapting to potential supply and demand impacts as a result of climate change. Climate change is a significant ongoing issue to water utilities and state and federal legislators. The state is experiencing increased weather extremes and variability due to climate change that have led to significant deviations from historical averages impacting water supply planning on all levels. As a result, the region may experience longer seasonal dry periods, which is expected to increase evaporation in the region (San Diego RWMG, 2019). As noted in the *2019 San Diego Integrated Regional Water Management (IRWM) Plan*, climate change may affect water supply availability because of droughts, seawater intrusion, changes in precipitation volumes and timing, altered fire and weather regimes, and potential changes in the availability of imported water supplies. Water quality degradation and sea level rise are also water management concerns attributed to climate change in the region.

The Water Authority recognizes the importance of adapting to climate change and is a leader in sustainability and natural resource stewardship. The current *2021-2025 Water Authority Business Plan* (Water Authority, 2020c) contains climate change management strategies within the Sustainability Program Focus Area. The identified climate change management strategies include:

- Implement cost-effective opportunities that mitigate greenhouse-gas emissions in compliance with emission targets contained in the Climate Action Plan.
- Pursue partnerships on leading-edge climate science projects and evaluate opportunities to incorporate climate research into planning processes.

Water Authority’s Activities Related to Climate Change Concerns

Knowledge Sharing and Research Support

The Water Authority is an active and founding member of the Water Utility Climate Alliance (WUCA). WUCA is dedicated to enhancing climate change research and improving water management decision making. WUCA consists of 12 of the nation’s largest water providers collaborating on climate change adaptation and GHG mitigation issues. Each year, WUCA develops a list of projects that will help meet priorities outlined in its strategic plan. Below is a list of WUCA’s identified projects:

- Business Function Mapping
- Climate-Resilient Planning for Urban Stormwater and Wastewater Utilities
- Climate Resilience Training
- Communications Phase 2: Engineering Case Studies

- Heat Impacts on Infrastructure & Personnel
- Leading Practices in Climate Adaptation

In addition, WUCA has established several sub-committees (such as Sea Level Rise, Best Practices, GHG Mitigation, and Stormwater and Wastewater) to foster discussion and information sharing between WUCA agencies.

The Water Authority supports initiatives that incorporate considerations of climate change into water management planning. It is with this guiding principle that in 2020 the Water Authority became a founding member of the Center for Western Weather and Water Extremes (CW3E) Water Affiliates Group (WAG). The WAG provides water leaders with information on advances in atmospheric river and drought research that can be used to improve water management, mitigate flood risk and increase water supply reliability. The WAG also connects like-minded water managers to share best practices in forecast-informed water operations and provides practical tools to support core water management services. Additionally, the San Diego IRWM Program, managed by Water Authority staff, has connected with climate change focused organizations, including the Climate Science Alliance and the San Diego Regional Climate Collaborative, which work to build a network of scientist, leaders, educators, artists, and others to expand understanding of the effects of climate change on the San Diego region (San Diego RWMG, 2019).

Ongoing Research

The Water Authority has partnered on several research projects to better understand the uncertainties and impacts associated with climate change on water demand and local water resources in the San Diego region. Participating in a multi-agency project through the Water Research Foundation, the Water Authority collaborated on a study to evaluate potential demand-side impacts of climate change by examining ways to model the effects of climate and weather on water use. A methodological framework was developed to prepare downscaled climate projections and identify specific climate scenarios. Through this effort, an ensemble of case studies was developed to estimate a range of potential demand-side impacts. This methodology is described in *Section 2.4.4, Projected Climate Change Impact on Water Demands*, and used to model regional demands under the influence of climate change.

The Water Authority also partnered with the City of San Diego and the Bureau of Reclamation (Reclamation) on a *San Diego Watershed Basin Study* (San Diego Basin Study) to examine supply-side climate change impacts (USBR, 2019). Completed in July 2019, the San Diego Basin Study examined the potential influence of climate change on local and imported water resources in the San Diego region, analyzed the region's existing infrastructure, and developed adaptation strategies to address the uncertainties associated with climate change. A Customized Trade-Off Analysis Tool was developed as a product for the San Diego Basin Study to provide a framework for modifying the trade-off analysis and allow modifications to weights of importance of Evaluation Objectives.

Programs and Policies

The Water Authority has made great strides and is continuing to adapt to climate change and implement GHG mitigation programs and policies for its facilities and operations. Through conserving water, implementing GHG-reducing measures, and investing in projects that will ensure reliable water supply and generate renewable energy, the Water Authority is on track to meet its reduction targets for the foreseeable future (Water Authority, 2020b). To date, these programs and policies have focused on the following:

- Updating of the Water Authority's Climate Action Plan in 2019
- Continuing water supply/energy relationships and implementing mitigation measures to reduce GHG emissions, including energy conservation opportunities, pump upgrades, solar PV installation, and in-line hydropower generation
- Participating in the Climate Registry; the Water Authority developed its GHG inventory for calendar year 2019 and plans to have it third-party verified and entered into the Climate Registry database
- Installing global positioning system units in most of its fleet to improve vehicle dispatch planning and allow for data collection
- Replacing older vehicles with newer, more efficient vehicles and with hybrids when possible
- Generating solar power at three Water Authority sites, including the Twin Oaks Valley WTP, the Escondido Operations Center, and the San Diego Headquarters, cumulatively generating an estimated 2.5 million kilowatt-hours of energy each year

The Water Authority's *Climate Action Plan* was updated in 2019; the Water Authority and its consultant reviewed the inventory ensuring consistency with current methodologies, practices, and guidance within California. The *Climate Action Plan* was updated to track the Water Authority's carbon footprint, estimate future GHG emissions, document progress on GHG reduction measures, identify future GHG reduction measures, and highlight monitoring and reporting protocols on GHGs. In the *Climate Action Plan*, the Water Authority identified the following additional opportunities for reducing GHG emissions within its operations:

- GHG reduction opportunities in the Water Authority's Capital Improvement Program planned projects
- Energy Conservation Opportunities identified in the 2012 Energy Audit
- Renewable energy credits (RECs) for the Rancho Peñasquitos Hydroelectric Facility and the proposed Alvarado Hydroelectric Facility

The 2019 Energy Management Policy, adopted by the Board in June 2019, provides guidelines to build a robust Energy Program that supports the Water Authority's mission by minimizing energy costs and using existing and new infrastructure to generate revenues to offset water rates. This policy, in conjunction with the Water Authority's *Climate Action Plan*, will also

provide environmental benefits to the region by helping to reduce GHG emissions associated with energy. The 2019 Energy Management Policy objectives focus on six areas:

1. Evaluate creative alternatives to procure lower cost energy supplies
2. Monitor electric power markets and adjust existing system operations to minimize energy costs
3. Seek new economically sound energy generation and storage opportunities
4. Incorporate cost effective, energy efficient equipment and features into the Water Authority's Capital Improvement Program (CIP), Asset Management, or facility retrofit projects
5. Develop collaborative relationships with compatible federal, state and local agencies or private organizations to maximize energy program benefits
6. Support government relations energy goals as outlined in the current Legislative Policy Guidelines and Federal Legislative Priorities

This policy will be reviewed and updated biennially.

1.7.4 Population

When the Water Authority was formed in 1944, the population within its service area was estimated at roughly 260,000 people. With approximately 3.3 million people in 2020, the population within the Water Authority's service area is projected to increase to roughly 3.8 million people by 2045 (see Table 1-4). The City of San Diego represents the largest population of all Water Authority member agencies, with about 1.4 million people in 2020. Of the Water Authority member agencies, Yuima MWD has the smallest population at approximately 1,900 people. (These regional growth projections are based on the San Diego Association of Governments [SANDAG] *Series 14 Regional Growth Forecast (version 17)* (SANDAG, 2019a), developed for its *2019 Federal Regional Transportation Plan* (SANDAG, 2019b) adopted by SANDAG's Board of Directors on October 25, 2019.

Table 1-4. Water Authority Service Area Population Forecast (2025–2045)

Year	Population
2025	3,442,340
2030	3,536,336
2035	3,623,655
2040	3,709,299
2045	3,789,443
Average Annual Growth	17,355

Source: SANDAG *Series 14 Regional Growth Forecast (version 17)*

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SECTION 2 WATER DEMANDS

Demand for water in the Water Authority's service area falls into two classes of service: municipal and industrial (M&I) demand and agricultural demand. In fiscal year 2020, total water demand was 463,128 AF, of which 92% was for M&I use and 8% was for agricultural water use (primarily for irrigation of nurseries, groves, and crops). This section describes these use categories along with the total historical, current, and projected water demands. By 2045, the Water Authority's total normal water demands are projected to reach 630,771 AF (including future conservation, demand associated with projected near-term annexations, and accelerated forecasted growth), which represents a 36% increase from the fiscal year 2020 demand.

2.1 Municipal and Industrial Water Demand (M&I)

M&I demand encompasses water uses that include residential demand (i.e., water used for human consumption in the home, domestic purposes, and outdoor residential landscaping) and water used for commercial, industrial, and institutional purposes.

2.1.1 Residential Demand

Residential water consumption covers both indoor and outdoor uses. Indoor water uses include sanitation, bathing, laundry, cooking, and drinking. Most outdoor water use entails landscape irrigation. Other minor outdoor uses include car washing, surface cleaning, and similar activities. For single-family homes, outdoor demands may constitute up to 60% of total residential use.

The estimated composition of San Diego's 2019 regional housing stock was approximately 60% single-family homes, 36% multi-family homes, and 4% mobile homes (SANDAG, 2020). Single-family residences generally contain larger landscaped areas and require more water for outdoor application in comparison to other types of housing. The general characteristics of multi-family and mobile homes limit outdoor landscaping and water use, although some condominium and apartment developments do contain greenbelt areas.

2.1.2 Commercial and Industrial Demand

Commercial water demands are primarily associated with the operation of a business or institution, such as drinking, sanitation and landscape irrigation. Major commercial water users include service industries, such as restaurants, car washes, laundries, hotels, and golf courses. Economic statistics developed by the U.S. Bureau of Labor Statistics indicate that over 628,000 of San Diego's residents are employed in commercial (trade, transportation, and utilities; professional and business services; and leisure and hospitality) industries (U.S. Bureau of Labor Statistics, 2020).

Industrial water consumption consists of a wide range of uses, including product processing and small-scale equipment cooling, sanitation, and air conditioning. Water-intensive industrial uses in the region, such as electronics manufacturing and aerospace manufacturing, typically require smaller amounts of water compared to other water-intensive industries found elsewhere in Southern California, such as petroleum refineries, smelters, chemical processors, and canneries.

Tourism in the County affects water use in the Water Authority's service area not only by through number of visitors, but also through expanded service industries and attractions, which tend to be larger outdoor water users. Tourism activity is primarily concentrated in the summer months and affects seasonal demand peaking. SANDAG's regional population forecasts do not specifically account for tourism, but tourism is reflected in the economic forecasts and affects per capita water use.

2.2 Agricultural Water Demand

With a moderate climate and virtually frost-free coastal and inland valley areas, the County supports a wide variety of subtropical crops, making it a unique region for agricultural production. The introduction of relatively low-cost water supplies in the 1950s allowed significant growth in this sector. Due to regional development and raising costs, agricultural activities in the Water Authority's service area are now primarily concentrated in the northern parts of the County, mainly in the following member agencies services areas:

- Rainbow Municipal Water District
- Valley Center Municipal Water District
- Ramona Municipal Water District
- Yuima Municipal Water District
- Fallbrook Public Utility District
- City of Escondido

The primary crops grown for local, national, and international markets include avocados, citrus, cut flowers, vegetables, vine crops and nursery products.

Starting in calendar year 2008 through April 2011, member agency customers that were voluntarily receiving the agricultural water rate were required to implement a 30% cutback in agricultural demand from their fiscal year 2007 baseline. In response to supply cutbacks from Metropolitan, allocations for agricultural program participants were again imposed for fiscal year 2016 at 15%. To comply with the mandatory supply allocations that resulted from drought conditions and judicial restrictions on State Water Project supply availability, growers implemented various actions that included tree stumping and plant stock reduction. As a result, agricultural demand dropped from 98,262 AF in fiscal year 2007 to 31,696 AF in fiscal year 2016, a 68% drop in program agricultural demand. This reduced level of agricultural demand has continued, with agricultural water use in the Water Authority's agricultural program averaging roughly 28,000 AF over fiscal years 2018-2020.

2.3 Total Current and Historical Water Use

Water use in the San Diego region is closely linked to the local economy, population, and weather. Over the last several decades, a prosperous economy stimulated local development and population growth, which in turn produced a relatively steady increase in water demand. However, starting in the late 2000s, the combination of economic recession, Metropolitan supply allocations, implementation of member agency mandatory water-use restrictions, and more recently, state-mandated emergency water regulations culminated in a dramatic multi-year decrease in total water demand. In fiscal year 2007, water demand in the Water Authority's service area reached a record level of 741,893 AF before dropping roughly 38% to 463,128 AF by fiscal year 2020, a 278,765 AF reduction. Despite experiencing consistent above-average monthly maximum temperatures for the last several years, this drop in water demand is attributable to a combination of factors, including above-average rainfall at San Diego Lindbergh Field in four of the last five fiscal years, continuing conservation efforts, a growing water use efficiency ethic, and consumer price response to the retail cost of water. Table 2-1 shows the historical water demand within the Water Authority's service area.

Table 2-1. Historical Water Demand within Water Authority Service Area (2005–2020)

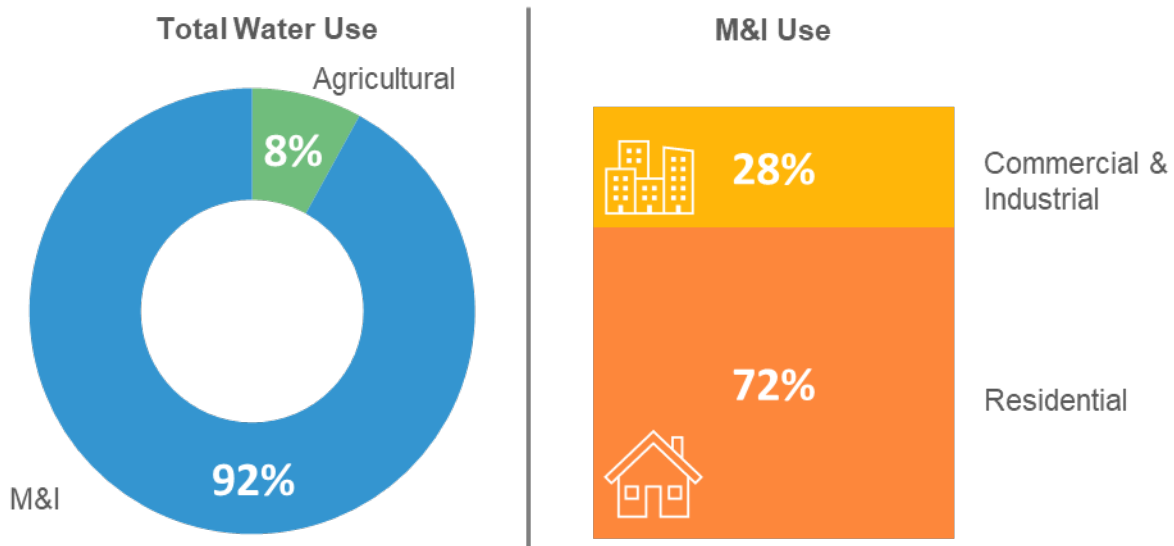
Fiscal Year ^a	Water Use (AF)
2005	642,152
2006	687,253
2007	741,893
2008	691,931
2009	643,900
2010	566,443
2011	526,945
2012	542,438
2013	573,901
2014	594,535
2015	539,361
2016	454,963
2017	477,024
2018	518,397
2019	463,329
2020	463,128

Source: Water Authority Annual Reports.

^a The Water Authority's fiscal year begins July 1.

Figure 2-1 shows the estimated relative percentages of various categories of water demand within the Water Authority's service area for fiscal year 2020. In this figure, residential demand includes single-family residential and multi-family residential.

Figure 2-1. Estimated Type of Water Use Fiscal Year 2020



2.4 Projected Water Demands

The Water Authority uses a statistical modeling approach to develop its long-range demand forecast. For the M&I sector, this methodology is based on the U.S. Army Corps of Engineers Municipal and Industrial Needs (MAIN) model, which is used by many cities and water agencies throughout the United States. The Water Authority's model, known as CWA-MAIN, was customized by a consultant to reflect the San Diego region's unique parameters. Through a set of econometric equations, the CWA-MAIN model relates historical water demand patterns to variables such as household income, consumer response to the price of water, and weather, to predict future M&I water demands. These datasets are compiled from various sources, including SANDAG, Water Authority member agencies, and the National Aeronautics and Space Administration (NASA). Pursuant to the 1992 Memorandum of Agreement (MOA) between the Water Authority and SANDAG, the Water Authority uses SANDAG's growth forecast to project consumptive water demands for the region. SANDAG's growth forecast is in turn based on general plans and policies of local land use jurisdictions. This coordination ensures linkage between local jurisdictions' general plan-based development and the Water Authority's projected water demands.

Demographic and economic projections from the SANDAG *Series 14 Regional Growth Forecast* (Version 17; SANDAG, 2019a), developed for its *2019 Federal Regional Transportation Plan* (SANDAG, 2019b), were used for the baseline demand forecast update. Version 17 was selected because it was the most recent version available when the modeling was initiated in fiscal year 2019. The *2019 Federal Regional Transportation Plan* was adopted by SANDAG's Board of Directors on October 25, 2019. Future updates of the UWMP, which occur every five years, will utilize the most recent SANDAG demographic and economic projections available at that time.

Two key modifications were made to SANDAG's Series 14 Regional Growth Forecast (Version 17) as compared to previous versions. First, in response to Assembly Bill 1086, which requires that population forecasts developed by councils of governments be within 1.5% of the total regional population forecast prepared by the California Department of Finance, SANDAG adopted a new approach to utilize Department of Finance population projections for its regional population control totals. Second, because of the projected number of housing units needed to meet the population projections, SANDAG utilized all available housing unit capacity from local jurisdictions. Housing unit capacities are determined by a local jurisdiction's interpretation of their general plans and govern how many units can be accommodated based on land use and available area out to the year 2050.

SANDAG's growth forecast does not include projections for development on Marine Corps Base (MCB) Camp Pendleton. Therefore, water demand projections for MCB Camp Pendleton were developed outside of the CWA-MAIN model and based on projections provided by MCB Camp Pendleton staff.

The agricultural sector model equations were developed using data provided by Water Authority member agencies, SANDAG, and County Department of Agricultural Weights and Measures. Variables used in the agricultural model include irrigated acreage in the Water Authority's service area, distribution of acreage among primary crop types, price of water, general macroeconomic conditions, and water requirements by crop type. SANDAG's projection of agricultural land conversions to other land use categories provides the long-term trend in acreage used to forecast agricultural water use. The total agricultural forecast is derived by multiplying projections of future acreage by average water use per acre, which assumes the currently prevailing distribution of crop acreages, long-term normal weather and economic trends, and expected growth in the Water Authority's wholesale water rates.

2.4.1 Projected Normal Water Demands

Projected baseline regional water demand for normal water years in the Water Authority service area is shown Table 2-2. *Baseline regional demand projections exclude future additional conservation savings, but reflect historical conservation savings through 2018.* In addition, to quantify all potential demands served by the Water Authority, a small increment of water use associated with known potential near-term annexations and accelerated forecasted growth was incorporated into the demand forecast. Beginning with the 2005 UWMP, an increment of demand related to potential near-term annexations was added to the baseline M&I forecast and assumed to be fully online by 2030. Estimated demands for these parcels were provided to the Water Authority by the associated member agency and included in the demand forecast as an aggregated yearly total. A detailed member agency level breakdown is shown in Appendix K. However, incorporation of these demands provides no assurance of annexation. Approval by the Water Authority Board is still required before water service may be provided to these lands.

Table 2-2. Total Regional Baseline Demand Forecast (Excludes Future Conservation) (AF)^a

	2025	2030	2035	2040	2045
Baseline M&I Demand ^{b,c}	563,316	588,788	614,166	636,799	655,709
Baseline Agricultural Demand	47,094	46,351	45,609	45,556	45,501
Accelerated Forecasted Growth	2,072	3,817	5,526	7,298	9,051
Near-Term Annexations ^d	5,688	6,208	6,208	6,208	6,208
Total Baseline Demand Forecast	618,169	645,165	671,509	695,860	716,469

Notes:

^a Normal water year demands based on 1960–2018 hydrology.

^b Includes approximately 12,000 AF to 13,000 AF of demand for MCB Camp Pendleton; provided by MCB Camp Pendleton staff.

^c Reflects historical conservation savings through 2018

^d Known near-term annexation demands, member agency level breakdown included in Appendix K.

To provide for a more comprehensive planning analysis, the 2020 UWMP includes water use associated with accelerated forecasted growth in residential housing development as part of the M&I sector demand projections. These forecasted housing units were identified by SANDAG in the course of producing its *Series 14 Regional Growth Forecast* (Version 17; SANDAG, 2019). The demand associated with accelerated forecasted growth is intended to account for a portion of SANDAG’s estimated residential land use development currently projected to occur beyond the Water Authority’s 2045 planning horizon, but has the potential to move forward on an accelerated schedule. SANDAG estimates that general plan amendments, allowing this accelerated residential development, could happen within the planning horizon of the 2020 UWMP. Demands associated with accelerated housing development are calculated based on efficient residential water use, which is consistent with anticipated future levels of conservation savings described in *Section 2.4.2 Projected Future Conservation Savings*. Since this increment of projected demand is not broken out by member agency, the accelerated forecasted growth component is incorporated into the demand forecast at a regional level. It should be noted that once water demands associated with accelerated forecasted growth are incorporated into a member agency’s UWMP demand forecast, those water demands are removed from the accelerated forecasted growth demand increment.

Water Code Section 10631.1 states that UWMP demand projections shall include water-use estimates for low-income single-family and multi-family residential households. Regional water demand projections listed in Table 2-2 represent water-use estimates for all income levels (including low-income households) contained in SANDAG’s *Series 14 Regional Growth Forecast* (Version 17).

The Water Authority has implemented programs and procedures to proactively maintain its water distribution system and minimize system losses. For demand forecasting purposes, Water Authority system losses were set at 1% of annual baseline regional water demands and included in the Total Regional Baseline Demand Forecast.

Using these factors, the Water Authority's system losses were estimated as follows:

- 2025: 6,200 AF
- 2030: 6,500 AF
- 2035: 6,700 AF
- 2040: 7,000 AF
- 2045: 7,200 AF

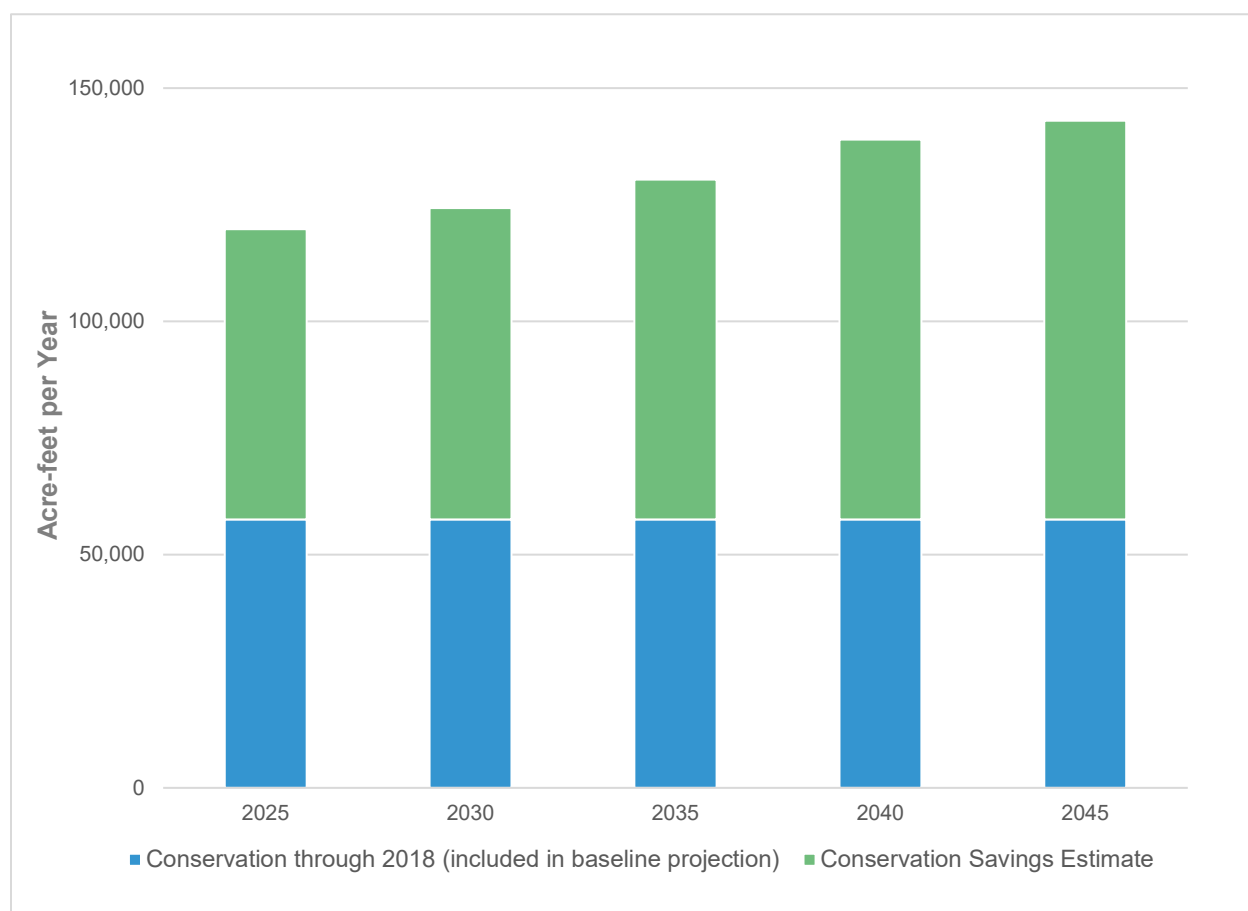
2.4.2 Projected Future Conservation Savings

With the regional baseline forecast established, future water conservation savings are then estimated. Conservation is an important resource strategy for ensuring a cost-effective reliable supply of water for the region. There are several factors that impact water demand, including the economy, climate, weather, regulations, and deliberate conservation programs. In the past five years, water demand has been impacted by many of these factors. From 2014 through 2017, the State of California was in a state of emergency due to drought. During that time period, demand was driven down by mandatory SWRCB regulations that required reductions in retail urban water use of up to 36%. The mandatory demand reductions resulted in the aggressive implementation of conservation programs with long-term demand impacts (such as turf removal programs), as well as short-term behavior changes (such as deficit irrigation). For the 2020 regional demand forecast, conservation water savings were estimated based on long term quantifiable actions.

The Alliance for Water Efficiency Water Conservation Tracking Tool (AWE Tool) is listed in the DWR *2020 UWMP Guidebook* as an application to assist water purveyors in developing savings estimates (DWR 2020). This industry standard planning tool was used to provides granular estimates of existing and future "passive" or code-based water savings and "active" savings resulting from the implementation of demand management programs. Key water savings assumptions are derived based on historical program efficiencies, current regional water savings assumptions that serve as the basis for regional incentives, and efficiency estimates by activity type that are contained in the AWE Tool library.

Future active conservation savings are set at the 2020 level of conservation program activity moving forward, absent a large-scale turf replacement program and state-mandated water-use reductions. The passive conservation element includes estimated future savings from appliance standards and code changes, as well as savings from the *2015 Model Water Efficient Landscape Ordinance* (MWELO; DWR, 2015). An 80% MWELO compliance level was assumed on new residential development and a majority of this savings was assumed to continue over the UWMP planning horizon. To account for conservation included in the baseline regional demand forecast, passive water savings from before 2018 was subtracted from the estimated water savings. Figure 2-2 shows calculated conservation savings with water savings through 2018 included in the baseline projection.

Figure 2-2. Calculated Conservation Savings (AFY)



The calculated water savings minus the conservation savings through 2018 are deducted from the baseline demand forecast to generate the long-term water demand projection for the region. Table 2-3 contains total future regional conservation savings projections.

Table 2-3. Projected Future Conservation Savings (AF)

	2025	2030	2035	2040	2045
Active Conservation	38,536	33,311	32,188	32,150	27,594
Passive Conservation (Post-2018)	23,875	33,610	40,847	49,475	58,104
Total Additional Conservation Savings	62,411	66,921	73,035	81,625	85,698

These conservation savings projections are then subtracted from the projected baseline demand forecast derived from the Water Authority's CWA-MAIN model to give the long-range demand forecast in five-year increments (Table 2-4).

Table 2-4. Normal Year Regional Water Demand Forecast Adjusted for Water Conservation (AF)

	2025	2030	2035	2040	2045
Total Regional Baseline Demand	618,169	645,165	671,509	695,860	716,469
Additional Conservation	(62,411)	(66,921)	(73,035)	(81,625)	(85,698)
Total Long-Range Demand Forecast with Conservation	555,758	578,244	598,474	614,235	630,771

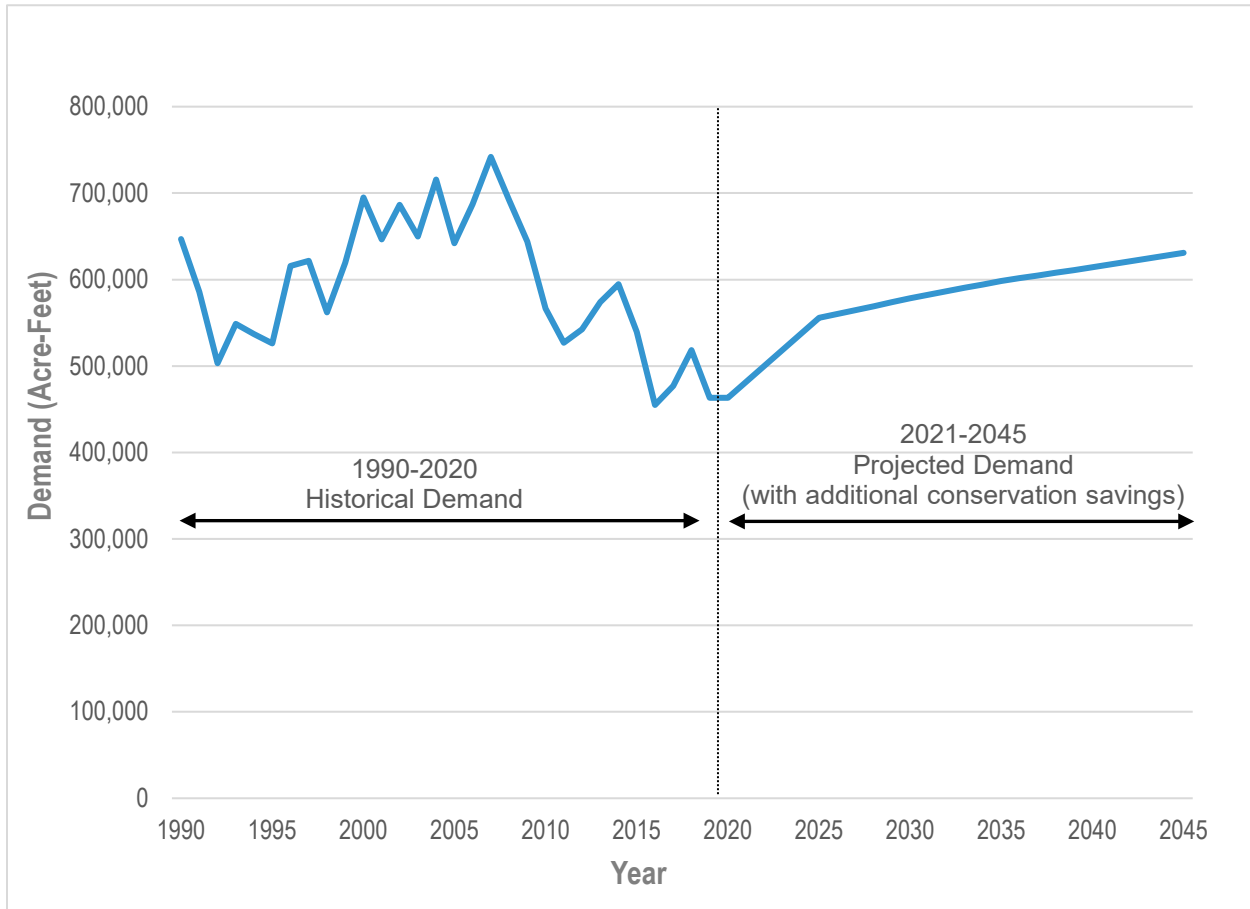
Conservation has long been a staple of water management on California. In 2009, the Water Conservation Act of 2009 (also known as SB X7-7) was enacted to require retail urban water agencies within the state to achieve a 20% reduction in urban per capita water use by Dec. 31, 2020 (Water Code Section 10608.20) and report progress in meeting water-use targets (Water Code Section 10608.40). The Water Authority is a wholesale agency not subject to these requirements. In 2015, member agencies' SB X7-7 acre-foot potable demand targets were calculated based on gallons per capita per day (GPCD) targets provided by the member agencies and SANDAG population projections. The member agencies' SB X7-7 potable demand target calculated for 2020 was 619,323 acre-feet; actual potable water use was 457,964 acre-feet.

After the most recent drought, California moved to increase conservation beyond the 2020 targets and new conservation legislation was signed into law in 2018. SB 606 and AB 1668 created a framework and directed DWR and SWRCB to develop and adopt long-term, water-use efficiency targets. Each retail water supplier across the state will have a water use target based on efficiency standards for indoor residential water use, landscape irrigation, and water loss. These targets are currently being developed and projected to be adopted in 2022. Retail water suppliers will be required to meet demand targets by 2027 or face penalties set by SWRCB.

The impact of long-term targets on each member agency is unknown, but the San Diego region has a long history of investing in water conservation programs and education. Recent intensive investments in water use efficiency in response to the multi-year drought have put member agencies on a good trajectory to meet future water use efficiency targets.

Figure 2-3 illustrates the forecasted trend in projected water demands over the 2025 to 2045 time period. This figure combines historical water use and forecasted normal year demands reduced by future additional conservation savings.

Figure 2-3. Regional Historical and Projected Normal Water Demands (AF)



2.4.3 Projected Dry-Year Water Demands

In addition to a baseline regional demand projection for normal years, the UWMP Act also requires single dry-year and multiple dry-year demand estimates to evaluate water service reliability during dry-year events. Based on observed historical demand impacts associated with each of these events, separate approaches were taken to forecast single and multiple dry-year conditions.

To develop single dry-year projections, a demand response index formula was used to identify the historical high temperature and low rainfall weather parameters that resulted in the maximum impact. Using this index, a representative single dry year was selected. For this forecast, the year 2015 was selected. The monthly weather patterns associated with 2015 were then substituted into the CWA-MAIN model to generate dry-year demand projections. By holding all non-weather-related predictive variables constant, the model produced an annual forecast of dry-year weather-driven demand. Table 2-5 shows projected single dry-year demands for the Water Authority service area in five-year increments.

Table 2-5. Single Dry-Year Regional Water Demand Forecast Adjusted for Water Conservation (AF)

	2025	2030	2035	2040	2045
Single Dry-Year Demand	659,376	685,800	712,345	736,679	757,018
Future Conservation Savings	(62,411)	(66,921)	(73,035)	(81,625)	(85,698)
Total Single Dry-Year Demands with Conservation	596,965	618,879	639,310	655,054	671,320

In accordance with the UWMP Act, agencies are also required to prepare additional dry period scenarios spanning five consecutive years. Water demands for the multi-dry year scenario were calculated based on a 1% annual increase in water use from the single dry-year demand forecast. This approach to multiple dry-year scenario development was used to account for assumed Water Authority and member agencies' demand management measures implemented during the drought conditions that would result in lower demand increases than those normally associated with hot/dry weather. Table 2-6 lists multiple dry-year demand projections net of future conservation savings.

Table 2-6. Multiple Dry-Year Water Demand Forecast Including Future Conservation Savings (AF)^a

	2026	2027	2028	2029	2030
Total Multi Dry-Year Demands with Conservation Savings	602,935	608,964	615,054	621,204	627,416
	2031	2032	2033	2034	2035
Total Multi Dry-Year Demands with Conservation Savings	625,067	631,318	637,631	644,008	650,448
	2036	2037	2038	2039	2040
Total Multi Dry-Year Demands with Conservation Savings	645,703	652,160	658,681	665,268	671,921
	2041	2042	2043	2044	2045
Total Multi Dry-Year Demands with Conservation Savings	661,605	668,221	674,903	681,652	688,469

2.4.4 Projected Climate Change Impact on Water Demands

Evaluation of potential climate change impacts on water demand represents a prudent water resources planning exercise. However, definitive projections on the timing and magnitude of climate change-initiated variations to local temperature and precipitation patterns are still forthcoming. The body of work currently available from national and international research contains a wide spectrum of possible outcomes based on numerous climate-forcing scenarios run through an assortment of general circulation models (GCMs). In the absence of research consensus, the Water Authority has adopted a qualitative evaluation approach that uses a manageable number of climate change scenarios to develop a range of potential demands.

Advances in climate modeling have occurred since the release of the 2015 UWMP, including fine-scale precipitation and temperature projections based on GCM forecasts. These

projections, known as Localized Constructed Analog (LOCA) climate projections, are made available by the World Climate Research Programme's Coupled Model Intercomparison Project, Phase 5 (CMIP5). The CMIP5 LOCA¹ dataset consists of simulations of historical and future (1950-2099) daily precipitation and maximum/minimum temperature in 1/16th-degree latitude and longitude grid cells covering the conterminous United States. Simulations are produced using 32 different GCMs each paired with two different climate forcing scenarios, or representative concentration pathways (RCPs). The RCPs, named RCP 4.5 and RCP 8.5, reflect new projected scenarios of future global GHG emissions. Each RCP is based on an assumed "radiative forcing" (RF). RF is the change in net radiative flux (expressed in watts per square meter) at the upper atmosphere due to a change in an external driver, such as a change in the concentration of carbon dioxide. Thus, RF expresses the change in energy in the atmosphere due to GHG emissions. The following is a brief description of each RCP scenario:

- RCP 8.5 – High emissions scenario is consistent with no policy changes to reduce emissions and rising radiative forcing pathway leading to 8.5 watts per square meter in 2100. It was developed by the International Institute for Applied System Analysis in Austria.
- RCP 4.5 – Intermediate emissions scenario was developed by the Pacific Northwest National Laboratory in the United States, and radiative forcing stabilized shortly after year 2100 at 4.5 watts per square meter.

Surface weather from each GCM simulation is then downscaled from its native spatial resolution, generally 2-degree latitude and longitude grid cells, to the LOCA resolution using constructed analogs, or sampling of historical local weather patterns (at the 1/16th degree scale) that resemble the GCM projection and correcting any bias in the sample relative to the projection. A total of 64 LOCA downscaled climate projections are available from CMIP5 that represent various combinations of GCMs and RCP scenarios.

The development of demand forecasts based on alternative climate scenarios for the Water Authority's service area began by selecting LOCA scenarios (combination of GCM and RCP) reflecting central tendencies and extremes of climate projections, specifically:

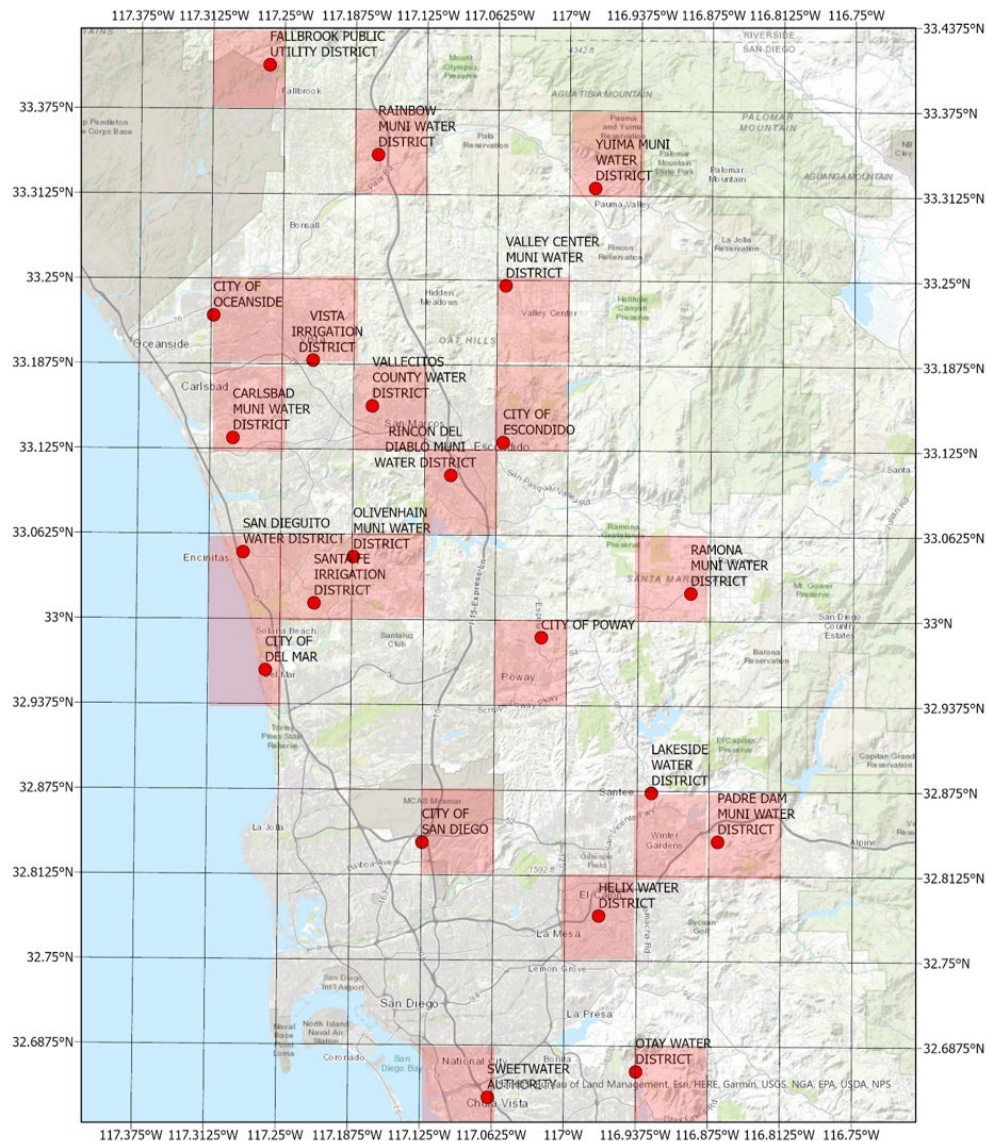
- Relatively large increases in both average temperatures and precipitation (Warm/Wet)
- Relatively large increases in average temperature and relatively large decreases in average precipitation (Warm/Dry)

¹ LOCA is the newest downscaling method used by CMIP5. Its predecessor, the Bias-Corrected Constructed Analog (BCCA), worked in a similar manner but downscaled at a 1/8th latitude-longitude resolution using historical samples of contemporaneous weather data across the entire nation-wide grid at once. This earlier method was applied to 20 GCMs using four RCPs, including the two listed above plus RCPs 2.6 (less severe than RCP 4.5) and 6.0 (between 4.5 and 8.5 in severity). LOCA does not provide results for RCPs 2.6 and 6.0. The prior BCCA method was found to create dry biases in arid regions due to its non-localized sampling approach. Both products are available from CMIP5, in addition to even earlier results from the predecessor program (CMIP3).

- Relatively small increases in average temperature and relatively large increases in precipitation (Cool/Wet)
- Relatively small increases in average temperature and relatively large decreases in precipitation (Cool/Dry)
- Moderate increases in average temperature and moderate changes in precipitation (Moderate)

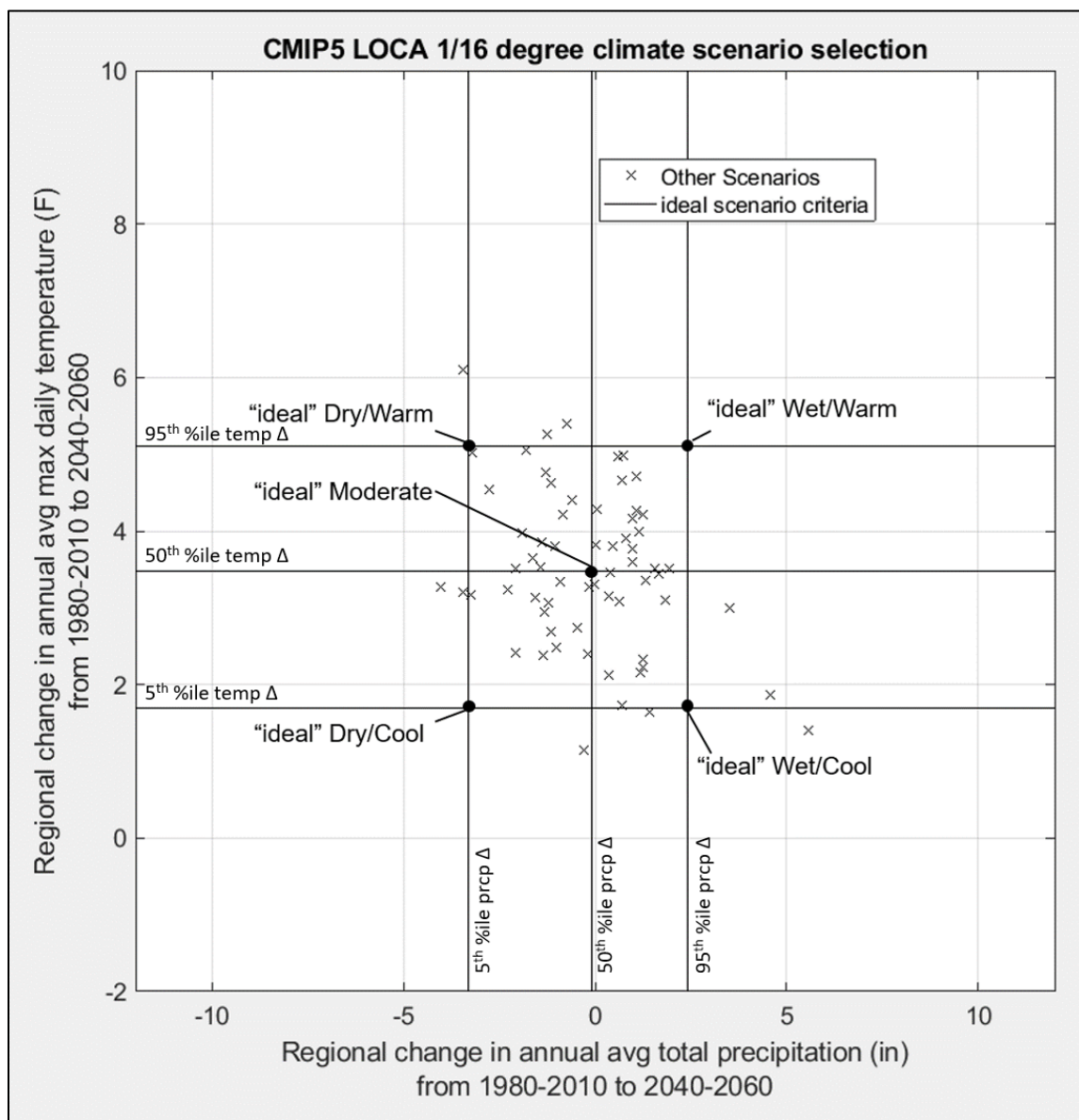
Initial scenario selections consisted of all available LOCA series in the grid cells containing each Member Agency's geographic centroid. Figure 2-4 shows Member Agency centroids and the corresponding LOCA cells that contain them. This resulted in 1408 time series of daily precipitation and maximum daily temperature covering 1950-2099, one for each scenario and Agency.

Figure 2-4. LOCA Grid Cells Selected for Member Agencies



Using these data, each scenario was summarized regionally by projected changes in annual precipitation and annual average daily high temperature. With each scenario time series in each grid cell, average annual total precipitation and average annual maximum daily temperature were determined over 1981-2020, 2040-2060, and 2080-2099; then changes in annual average precipitation and temperature were calculated. Projected changes in temperature and precipitation were then averaged within each scenario across selected grid cells, producing 64 pairs of regional average precipitation and temperature change, one for each scenario (x-symbols on Figure 2-5).

Figure 2-5. Scenario Climate Change Summaries for 2040-2060 and “Ideal” Climate Scenarios



Next, the distribution of temperature and precipitation summaries was characterized. The 95th, 5th, and 50th percentile values were calculated for each variable. Then, the approximate joint range of scenario weather was specified as combinations of percentile values of temperature and precipitation values:

- 95th percentile temperature and 95th precipitation values (Warm/Wet)
- 5th percentile temperature and precipitation values (Cool/Dry)
- 95th percentile temperature and 5th percentile precipitation values (Warm/Dry)
- 5th percentile temperature and 95th percentile precipitation values (Cool/Wet)
- 50th percentile temperature and 50th percentile precipitation values (Moderate)

These pairings are called “ideal” scenarios; they express the joint extents of scenarios, but generally they involve values from two different scenarios (black dots at intersections of horizontal and vertical lines on Figure 2-5).

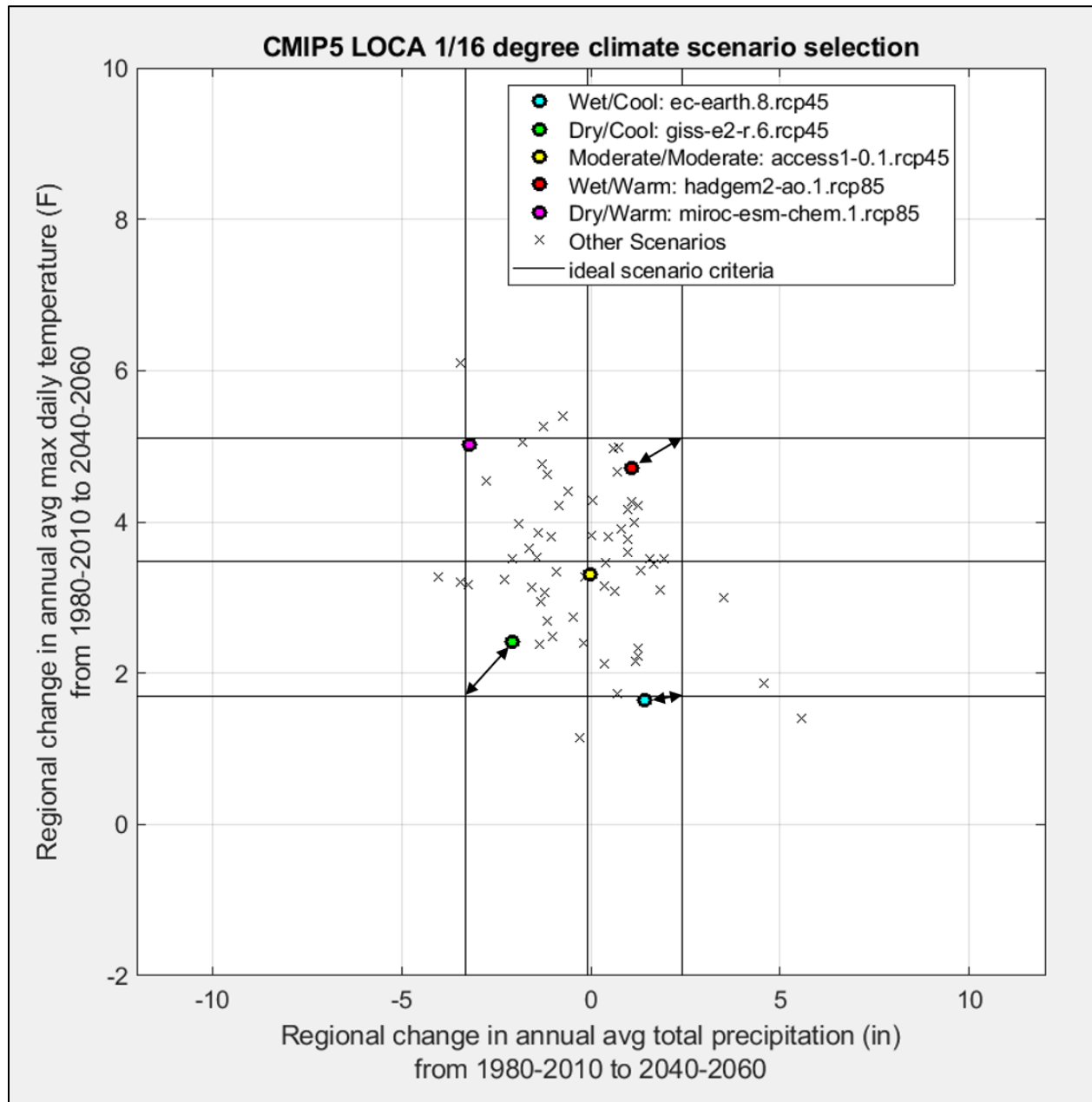
The final step of the scenario selection process involved the identification of individual model projections that have temperature and precipitation projections that were closest in values to the “ideal” scenario description (for example, the model projection that had a pairing of temperature and precipitation nearest to the “ideal” 95th percentile temperature change and 5th percentile precipitation change). Model projections that were closest to “ideal” conditions were chosen as the representative climate change scenarios (colored circles on Figure 2-6). The five climate change scenarios selected for 2040-2060 are shown in Table 2-7.

Table 2-7. Selection of Climate Change Scenarios for 2040-2060

Scenario	GCM	RCP
Wet/Cool	ec-earth.8	RCP 4.5
Dry/Cool	giss-e2-r.6	RCP 4.5
Moderate	access1-0.1	RCP 4.5
Wet/Warm	hadgem2-ao.1	RCP 8.5
Dry/Warm	miroc-esm-chem.1	RCP 8.5

No dramatic shifts in seasonal patterns of precipitation and average maximum daily temperature for the San Diego region were observed under any of the five scenarios. However, on average, annual amounts of precipitation tend to be more concentrated in the winter, with lesser proportions of total annual precipitation occurring in the spring and fall. Two of the climate scenarios resulted in average annual precipitation estimates for 2040-2060 lower than the 1980-2010 historic average. As mentioned above, all selected scenarios indicate warming on average relative to historical climate conditions, and the interaction of temperature and precipitation projections dictate the estimated impact on the baseline demand forecasts.

Figure 2-6. Selection of Climate Change Scenarios for 2040-2060



The range of climate change impacts on Water Authority water demands was calculated by substituting the five climate scenarios into the CWA-MAIN model. While the scenarios were identified using region-average temperature and precipitation, demand for each member agency was forecasted using the selected scenario's precipitation and temperature data for the individual member agencies' grid cell. This assured that demand forecasts for various member agencies were derived for a consistent scenario, would better represent real contemporaneous

weather regionally, and could be sensibly aggregated to regional totals, while retaining the climatic heterogeneity typical to the region.

Under the 2040–2060 climate projection period, the Wet/Cool and Dry/Cool scenarios resulted in lower estimates of total water demand above the baseline regional forecast for normal years and the Wet/Warm and Dry/Warm scenarios resulted in higher estimates of demand relative to the baseline regional forecast. This implies a greater influence of temperatures relative to precipitation, at least for the scenarios selected.

Using 2080–2099 climate projections, average projected impacts range from 3% decrease in water demand relative to historical normal weather conditions to about 10% increase in water demand under the Warm/Dry scenario. The results suggest that more significant water demand impacts associated with the forecasted trend toward warmer and drier climate conditions may occur on a time-step beyond the 2020 UWMP planning horizon.

2.4.5 Member Agency Demand on the Water Authority

Table 2-8 shows projected member agency water demands on the Water Authority (i.e., sales). Water demand on the Water Authority was calculated by subtracting verifiable local supply projections from projected normal year demand. Therefore, the projected imported demands are directly tied to the success of local supply development in *Section 5 Member Agency Supplies*, and compliance with water use efficiency legislation discussed in *Section 3 Demand Management*.

Table 2-8. Member Agency Normal Year Demand on the Water Authority (AF) ^{a,b,c}

Member Agency	Historical	Projected				
	2020	2025	2030	2035	2040	2045
Carlsbad Municipal Water District	11,719	12,728	13,081	13,513	13,947	14,472
Del Mar, City of	954	1,005	1,046	1,048	1,053	1,065
Escondido, City of	7,416	6,241	5,744	5,871	6,004	6,646
Fallbrook Public Utility District	7,893	7,298	7,622	8,218	8,557	8,848
Helix Water District	21,035	20,509	21,440	22,150	22,590	22,944
Lakeside Water District	2,879	3,436	3,376	3,364	3,417	3,457
Oceanside, City of	19,844	16,194	12,030	12,492	12,547	12,878
Olivenhain Municipal Water District	17,189	19,282	19,568	19,713	19,787	20,425
Otay Water District	28,309	31,677	33,948	36,748	39,979	43,477
Padre Dam Municipal Water District	9,585	6,436	7,213	7,868	8,176	8,514
Pendleton, MCB Camp	166	215	215	215	215	215
Poway, City of	8,837	10,087	10,344	10,589	10,717	11,046
Rainbow Municipal Water District	14,386	18,947	19,688	20,724	21,283	21,625
Ramona Municipal Water District	4,075	4,436	4,582	4,951	5,155	5,403
Rincon del Diablo Municipal Water District	4,839	6,421	6,889	7,107	7,429	7,780
San Diego, City of ^d	140,505	149,067	138,776	86,708	90,249	91,838
San Dieguito Water District	3,127	3,661	4,021	3,808	3,970	4,177
Santa Fe Irrigation District	5,642	6,049	6,631	6,404	6,531	6,907
Sweetwater Authority	2,456	9,175	9,349	9,462	10,090	10,417
Vallecitos Water District	10,877	13,992	14,828	15,481	16,788	18,934
Valley Center Municipal Water District	16,684	21,222	21,860	22,969	23,808	25,132
Vista Irrigation District	3,361	5,659	6,717	7,462	8,253	8,828
Yuima Municipal Water District	4,653	2,171	2,296	2,761	6,472	6,671
Subtotal	346,431	375,906	371,267	329,626	347,015	361,698
Accelerated Forecasted Growth ^e	0	2,072	3,817	5,526	7,298	9,051
Near-Term Annexations ^f	0	5,688	6,208	6,208	6,208	6,208
Total	346,431	383,666	381,292	341,360	360,521	376,957

Notes:

^a Based on SANDAG Series 14 Regional Growth Forecast (Version 17).

^b Includes historical and additional projected water conservation savings.

^c Assumes member agency implementation of verifiable local supply projects.

^d Excludes City of San Diego's wholesale demands.

^e Demands associated with accelerated forecasted growth are not attributed to individual member agencies and are listed for regional planning purposes.

^f A detailed member agency level breakdown is included in Appendix K.

2.5 Water Loss

Senate Bill 555 requires urban retail water suppliers to submit validated water audit reports to DWR every year. Senate Bill 555 is part of the State of California’s water efficiency legislation and targets reduction of distribution system water losses. Although the Water Authority is a water wholesaler and not a water retailer, it has voluntarily submitted annual water audits in accordance with Senate Bill 555 since 2017 in an effort to be transparent and accountable to its member agencies, other regional agencies, and various State agencies.

The process for conducting water loss audits is well defined and includes accounting for all volumetric inputs and outputs, studying the audit data sources, validating the data, and communicating system efficiency via metrics submitted to DWR. The volumetric inputs and outputs are conducted following methods by the American Water Works Association (AWWA) Manual M36 and the Free Water Audit Software (latest available version 5.0), and includes quantification of various water volumes for the Water Authority’s system. The audit data sources are studied to document the potential uncertainty of the data and help correct for known errors. The Water Authority’s data is then validated by a technical expert, certified through the AWWA certification process to confirm the basis of all data entries and ensure that it is appropriately characterized. Finally, the Water Authority communicates system efficiency by reporting of water loss and performance indicators to DWR. The Water Authority’s validated water loss performance indicators are presented in Table 2-9.

Table 2-9. Water Loss Performance Indicators (Fiscal Year)^a

	2017	2018	2019
Data Validity Score	65	70	70
Infrastructure Leakage Index (ILI)	0.84	-1.54	-1.73
Real Loss Performance Indicator (gallons/mile main/day)	1,081	-1,984	-2,233
Apparent Loss Performance Indicator (gallons/connection/day)	1,126	7,441	6,120
Non-revenue Water as Percent of Cost of Operating System	0.1%	0.1%	0.1%

^a The current AWWA M36 and the Free Water Audit Software is for retail water agencies, therefore, some of the performance indicators, including negative numbers, may not yield appropriate results for wholesale water agencies, such as the Water Authority

There are distinct differences between the wholesale and retail systems that are not accounted for in the current version of the AWWA Water Audit Software (version 5.0), which resulted in a lower than desired validity score. Also, the reported real losses are a function of how the total supply and consumption is calculated and does not represent actual volumes of water leaks or unauthorized takes. To sustain and improve the validity score and reduce real and apparent water losses, the Water Authority has a proactive meter calibration program, a comprehensive pipeline rehabilitation program, and is in the process of updating the information management

application. In addition, the Water Authority is working with the State to adapt the methods for wholesale water agencies.

2.6 References

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Section 3 DEMAND MANAGEMENT

3.1 Introduction

Demand management, or water-use efficiency, is an important ongoing component of the Water Authority's long-term strategy to increase the reliability of the San Diego region's water supply through diversifying its water supply portfolio. Since 1991, in partnership with and support of its member agencies, the Water Authority's programs and initiatives cumulatively have conserved more than 1 million AF of water. In fact, per capita potable water use in the San Diego region has decreased 50% between fiscal year 1990 and fiscal year 2020. Several drivers impact the implementation of conservation. Most recently, a long-term drought resulted in the unprecedented implementation of statewide mandatory water demand restrictions.

From 2014 through 2017, California was in a state of emergency due to drought. In January 2014, by Executive Order B-17-2014, Governor Brown proclaimed a Drought State of Emergency and directed state officials to take all necessary actions to prepare for these drought conditions. In April 2015, by Executive Order B-29-2015, the governor directed the State Water Resources Control Board (SWRCB) to implement regulations to achieve a 25% reduction in potable urban water use. In May 2015, the SWRCB adopted emergency regulations that required retail water suppliers to reduce water demand between 4 and 36%. Suppliers were assigned water saving targets based on their residential gallons per capita per day (R-GPCD) water use. Suppliers with higher R-GPCD were required to meet higher demand reduction targets. Targets were adjusted in early 2016 to account for climate, drought resistant local supplies, and other factors. In May 2016, regulations were adopted to allow water suppliers to adjust targets based on an analysis of supply and demand. The Water Authority and its member agencies were able to eliminate individual retail demand reduction requirements with the demonstration of regional supply reliability even during continued drought conditions.

Even with the San Diego region's reliable supply of water, regional compliance with the state drought emergency actions and resulting regulations caused a significant reduction in demand. As water supply conditions improved in California, legislative efforts shifted to long-term water use efficiency targets. Two bills, Senate Bill 606 and Assembly Bill 1668, were adopted in May 2018. These two bills created a framework and directed DWR and the SWRCB to develop and adopt long term water efficiency targets. Each retail supplier across the state will have a water use target based on efficiency standards for indoor residential water use, landscape irrigation, and water loss. These targets are currently being developed and projected to be adopted in 2022. Retail water suppliers will be required to meet demand targets by 2027 or face penalties set by the SWRCB.

The impact of long-term targets on each member agency is unknown, but the San Diego region has a long history of investing in water conservation programs and education. Recent intensive

investments in water use efficiency in response to the drought have put member agencies on a strong trajectory to meet water use efficiency targets.

While new water use efficiency targets are being developed, retail suppliers are still required to meet Water Conservation Act of 2009 (SBX7-7) targets. SBX7-7 was enacted in 2009 to require retail urban water agencies within the state to achieve a 20% reduction in urban per capita water use by December 31, 2020 (per Water Code Section 10608.20). While as a wholesale agency, the Water Authority is not directly subject to these requirements, the law does require that the Water Authority, as the wholesale supplier, support its retail member agencies' efforts to comply with SBX7-7 through a combination of regionally and locally administered active and passive water conservation measures, programs, and policies, as well as the use of recycled water (per Water Code Section 10608.36). Member agencies are currently meeting 2020 targets established in their individual 2015 UWMPs.

The Water Authority will continue to assist its retail member agencies in meeting water use efficiency targets. Examples of active measures and programs include residential and commercial device incentive programs, water-use surveys and education programs. Current Water Authority efforts include participation in Metropolitan's regional programs and coordination of the programs on behalf of the member agencies, partnerships with San Diego Gas & Electric (SDG&E) on water and energy saving programs, and regional tools and resources that improve water users' knowledge of how to effectively reduce outdoor water use.

3.2 Water-Use Efficiency Achievements

For more than three decades, the Water Authority has been a leader in promoting water-use efficiency through programs and partnerships. This section provides information on the Water Authority's achievements in this area, including grant funding, partnerships, education and outreach programs, local and regional rebate and incentive programs, tools, and resources that have helped accelerate the acceptance of water-efficient technologies and practices. These programs and outreach activities provide a foundation for the existing and future measures, programs, and policies discussed in the sections below that will support the member agencies' efforts to comply with the requirements of the new state framework and any state-mandated drought restrictions. For more detailed information on the programs, go to www.watersmartsd.org.

3.2.1 External Funding

The Water Authority supplements operational funding of its water-use efficiency programs through seeking external funding opportunities. The Water Authority was awarded federal, state, local, and private funding with a cumulative value of more than \$8.5 million from 2012 through 2020. External funding sources include Reclamation, DWR, SDG&E, County of San Diego, and the Hans and Margaret Doe Charitable Trust. Examples of the types of programs awarded grant funding in recent years are shown in Table 3-1 below.

Table 3-1. Grant Funded Programs

WaterSmart Landscape Makeover Program	Sustainable Landscapes Program
Landscape Water Use Evaluations	School Education Program
Drought Response Outreach and Communications	Agricultural Irrigation Efficiency Program
WaterSmart Turf Replacement Program	Detention Facility Retrofits Program
Agricultural Water Management Program	Turf Incentive Program
Qualified Water Efficient Landscaper Training	WaterSmart Landscape Efficiency Program

3.2.2 Water Authority Staffing

The Water Authority's Water Resources Department has four full time conservation positions. These staff members design, implement and manage regional water-use efficiency programs; develop and support water-use efficiency policy; provide technical assistance to its 24 member agencies; implement regional programs to support member agency compliance with state regulations; and perform grant acquisition and administration duties.

3.2.3 Regional WaterSmart Turf Replacement and Sustainable Landscapes Program

The Water Authority has implemented two regional, grant-funded turf replacement rebate programs. The WaterSmart Turf Replacement Program, which ran from December 2012 to January 2016, promoted outdoor water-use efficiency through financial incentives of \$1.50 per square foot to participants who replaced existing water-intensive turf grass with WaterSmart landscapes that included climate-appropriate plants and water-efficient irrigation systems. Nearly 800 properties representing 1.1 million square feet of turf removed received rebates totaling \$1.7 million from a combination of state and federal grant sources. Water savings from this program total 155 AFY and 2,321 AF over a 15-year lifetime.

The Sustainable Landscapes Incentive Program, which ran from October 2016 to June 2018, provided an incentive of up to \$1.75 per square foot for qualified residential sites (up to four dwelling units served by a single water meter) that replaced existing, water-intensive turf grass with alternative, water-efficient landscaping and incorporated storm water management practices. More than 280 properties covering 277,000 square feet of turf removal qualified for the incentive, which also reimbursed participants for project-related materials costs. Water savings from the Sustainable Landscapes Incentive Program total 37 AFY and 560.5 AF over a 15-year lifetime. The Sustainable Landscapes Incentive Program was funded through a state grant and was managed by a regional program partnership that included the Water Authority, City of San Diego, County of San Diego, California American Water, Association of Compost Producers, and Surfrider Foundation.

3.2.4 SoCal Water\$mart Residential Program

The SoCal Water\$mart regional residential program offers rebates for qualifying indoor and outdoor products including high-efficiency clothes washers, premium high-efficiency toilets, weather-based irrigation controllers, rotating sprinkler nozzles, rain barrels, cisterns and soil moisture sensor systems. Rebates are also available for customers who remove turf grass and replace it with a sustainable landscape. Since the Water Authority joined the program in 2008, more than 57,000 high-efficiency clothes washers and almost 30,000 high-efficiency toilets were installed in the region through the program. In addition, more than 17 million square feet of turf grass was removed. The estimated lifetime water savings for these and other water-saving measures exceeds 117,000 AF.

3.2.5 SoCal Water\$mart Commercial, Industrial, and Institutional Program

The SoCal Water\$mart Commercial, Industrial, and Institutional (CII) program offers an incentive to eligible CII customers to remove existing water-intensive turf grass and replace it with water-efficient landscaping. Through this program, more than 23 million square feet of turf grass has been replaced with water-efficient landscapes with a lifetime water savings of almost 35,000 AF. The SoCal Water\$mart CII program offered rebates to replace select, older, inefficient devices with water-efficient devices, including enhanced rebates for fixtures for fitness centers and rebates for public agencies for landscape devices. Since 2012, more than 255,000 water-efficient devices were installed in the region through the program with a lifetime water savings of more than 66,000 AF. Examples of the types of efficient water-use devices are shown in Table 3-2.

Table 3-2. Water-Efficient Devices Available through the SoCal Water\$mart CII Program

Plumbing Fixtures	Landscape Equipment
High-efficiency toilets Ultra-low and zero water urinals Plumbing control valves	Irrigation controllers Rotating and large rotary nozzles In-stem flow regulators Soil moisture sensor systems
Food Equipment	HVAC Equipment
Connectionless food steamers Air-cooled ice machines	Cooling tower conductivity controllers Cooling tower pH controllers
Medical and Dental Equipment	Commercial Incentives
Dry vacuum pumps	Commercial turf removal incentives

HVAC = heating, ventilating, and air conditioning

3.2.6 Member Agency Administered Programs

Metropolitan administers funding for locally-tailored conservation projects through its Member Agency Administered Program (MAAP). The Water Authority's annual MAAP allocation, which is based on water sales, is up to \$803,000 and is available for three types of projects: quantifiable, non-quantifiable and projects targeting disadvantaged communities (DAC). Quantifiable projects receive a set amount of funding for each AF of water saved. Water savings

assumptions must be based on verifiable studies and proven technology. Non-quantifiable projects are not required to have a verified water savings associated with them. Metropolitan currently only allows 25% funding to be used for these types of projects. The final type of program, DAC, allows for a higher rate of funding if the project targets water efficiency in DAC communities.

MAAP funding has supported the continuance of existing and the establishment of new water use efficiency programs. The Water Authority administers several regional programs that are funded in part by MAAP, including residential indoor and outdoor water efficiency audits, large landscape and agricultural water use surveys, and direct-install programs for low-income, mobile home and multi-family customers through a partnership with SDG&E. The Water Authority's member agencies have also received a share of the MAAP funding to implement innovative water efficiency programs in their service areas.

3.2.7 Water Savings Incentive Program

The Water Savings Incentive Program provides financial incentives to high water use commercial, industrial, institutional and agricultural customers to improve water-use efficiency through customized projects. Previous program projects included changing an industrial process water system to capture, treat and reuse process wastewater; installing new, water-efficient equipment in commercial kitchens and laundries; and contracting with a qualified water manager to improve landscape irrigation efficiency. More than 1,859 AF of water has been conserved through this program.

3.2.8 On-Site Recycled Water Conversions Program

The On-Site Recycled Water Conversions Program provides financial incentives to property owners to convert sites irrigated with potable water or industrial water systems to recycled water service. Items eligible for incentives included project design, permitting, construction costs associated with the retrofit of potable to recycled water systems, connection fees, and recycled water signage. More than 1,800 AF of water has been conserved through this program.

3.2.9 Audits and Surveys

WaterSmart Checkups

The Water Authority and its member agencies offer WaterSmart Checkups to assist single- and multi-family customers and businesses to identify water-saving opportunities specific to their site. Certified landscape irrigation auditors evaluate a site's landscape and irrigation system and provide the customer with a list of recommendations to improve water efficiency, including plant alternatives and a proposed watering schedule. Residential sites also receive an indoor evaluation that identifies water-wasting fixtures and practices. The service is provided at no cost to the customer. Almost 16,000 properties covering 4,000 acres have received audit services through this program.

Landscape Irrigation Surveys

Landscape irrigation surveys provide no-cost, site-specific water-saving recommendations from certified irrigation professionals to qualified sites with one or more acres of irrigated landscape. Eligible landscapes include commercial and industrial sites; homeowner association common areas; and institutional sites such as schools, parks, and government facilities. Almost 170 properties covering more than 1,000 acres have been surveyed through this program.

Agricultural Water Management Program

The Water Authority's Agricultural Water Management Program has provided agricultural water management services since 1990. Over that period, more than 2,300 agricultural irrigation system evaluations were performed on more than 36,500 acres of avocados, citrus, field flowers, and other fruits and ornamentals. The Agricultural Water Management Program provides technical assistance to growers to enable them to irrigate crops as efficiently as possible to obtain the maximum economic benefit from limited water resources.

The program provides additional assistance through visual observations of the irrigation system, an examination of soil and crop materials, pump testing, and individual advice. A written report summarizes the irrigation system's hydraulic characteristics and soil profiles and provides recommendations to improve the overall system efficiency. Local weather data and crop water demand information are also provided. Potential improvements in crop yield and water savings realized from improvements in irrigation efficiency are explained to the grower. Follow-up service is provided to determine if system improvements were implemented, and if not, to encourage implementation of the recommendations.

The program also includes an electrical conductivity (EC) mapping and soil sensor installation program to indicate where irrigation efficiencies should occur. During site visits, growers learn to identify soil properties that can affect crop production, that serves as the basis for precise irrigation management, rather than a reliance on calendars to make irrigation decisions. Rebates up to \$5,000 are available for property owners who purchase and install soil moisture sensors. Through this program 79 agricultural properties covering more than 1,755 acres have received more than \$104,000 in rebates. This program is funded by a Proposition 84 Round 4 IRWM Implementation grant from DWR.

3.2.10 Water and Energy Efficiency Programs

The Water Authority, its member agencies and SDG&E have worked together for 30 years to help homeowners in the County increase water and energy efficiency. In June 2018, the Water Authority and SDG&E expanded this collaboration and entered into a program contract to share in the cost of plumbing devices and appliances that save both energy and water. Since then, almost 53,000 devices have been installed throughout the joint service area.

Another partnership between the Water Authority and SDG&E is the Energy Savings Assistance Program (ESA), a direct-installation program administered by SDG&E and its vendors to provide

a variety of energy and water efficiency home upgrades to income-qualified homeowners and renters. More than 21,000 homes in the San Diego region have received improvements at no cost. Water efficient devices that have been installed include clothes washers, showerheads and thermostatic tub diverters, which are estimated to save more than 1,717 AF over a 10-year lifetime.

WaterSmart Landscape Efficiency Program

The WaterSmart Landscape Efficiency Program targeted a 20% reduction in water use at sites with multiple acres of irrigated landscape. The program achieved a portion of the water savings through a pre-implementation audit of the site's irrigation system to identify and fix any malfunctioning and broken irrigation components. Another portion of the water savings was achieved through services provided by a water management service company that adjusted the site's irrigation schedule to match irrigation demand. The program is currently being improved to address the reduction of stormwater runoff associated with dry weather flows and inefficient irrigation. Actual results show water consumption at participating sites decreased 26.1% through the WaterSmart Landscape Efficiency Program.

Correctional Facility Retrofits Program

The Water Authority has implemented two retrofit projects under its Correctional Facility Retrofits Programs. The Kearny Mesa Detention Facility Plumbing Retrofits project saved water and embedded energy through the installation of water-efficient devices, including electronic flush valves, low-flow showerheads with timers, and aerators. Based on previously established device savings, the retrofit project saved 289 AF over its 10-year lifetime.

Based on the success of the Kearny Mesa Detention Facility Plumbing Retrofits project, the Water Authority entered into an agreement with the California Department of Corrections and Rehabilitation to implement plumbing retrofits at the Richard J. Donovan Correctional Facility. This retrofit project is projected to save 930 AF over its 10-year lifetime.

3.2.11 WaterSmart Customer Education and Workforce Training

Consistent with its focus to promote the long-term market transformation of conventional urban landscapes to more water-efficient and sustainable landscapes, the Water Authority offers a variety of education and training opportunities for customers and landscape industry professionals. Course content is designed to promote best practices for landscape water-use efficiency while empowering customers to take action and make informed purchasing decisions when upgrading their landscapes. The following resources are offered in partnership with the Water Authority's 24 member agencies.

WaterSmart Landscape Makeover Series

The series of four workshops provides homeowners an overview and the basic skills necessary for the successful conversion of a traditional turf grass yard into a WaterSmart landscape. Participants receive technical assistance that includes a professional site inspection and

development of a base plan to scale, in addition to a professional design consultation. Upon completion of the course, participants have a landscape design with planting and irrigation plans that are ready for implementation. Recent program upgrades include providing stormwater retention plans based on “first flush” calculations. The average size of the turf replacement projects planned by participants is more than 1,000 square feet. Since 2014, more than 1,150 homeowners have completed the four-class series and pledged to upgrade 1.1 million square feet of turf to sustainable landscaping. This equates to more than 2,200 AF of water savings over the 15-year life of sustainable landscapes.

WaterSmart Landscape Design for Homeowners Workshop

To accommodate homeowners who prefer an abbreviated version of the WaterSmart Landscape Makeover Series of classes, the Water Authority developed a three-hour version of the classes. This short-format workshop accommodates higher numbers of participants per session, which helps to accelerate the number of homeowners who will be empowered to convert existing water-intensive yards into landscapes that can achieve significant water savings through climate-appropriate plant choices, irrigation efficiency upgrades and stormwater runoff prevention. More than 5,000 customers have attended the 125 workshops offered since 2015.

WaterSmart Landscape Makeover Videos on Demand

To help make the WaterSmart Landscape Makeover Series content more widely available and convenient to access, the Water Authority transformed the program into a series of online videos. These videos, as well as links to a variety of resources, take the participant through the steps to achieve a WaterSmart landscape. The steps include identification of their landscape target, creation of a basic plot plan, an evaluation of their site, soil analysis, landscape design, irrigation retrofit and landscape maintenance. Additional videos addressing sustainable landscape concepts such as capturing rainwater to prevent urban stormwater runoff were added in 2019.

Qualified Water-Efficient Landscaper (QWEL) Training

The Water Authority introduced this robust training program to San Diego County as a workforce training opportunity to help landscape industry professionals learn the latest techniques for landscape water-use efficiency. Originally developed by the Sonoma-Marín Saving Water Partnership, QWEL is recognized by U.S. Environmental Protection Agency (EPA) as a WaterSense-labeled Professional Certification Program for Irrigation System Audits. In the first two years of the QWEL program, 15 series were completed with 79% of participants passing the final exam and receiving their certification.

3.2.12 WaterSmart Tools and Resources

Feedback from polls and focus groups indicates the public understands the need for water-use efficiency, but is often overwhelmed by how to accomplish it. In response, tools and resources

were developed to inspire, educate and empower residents and businesses to take water-efficient actions that they can build upon. In addition, these tools and resources foster long-term behavioral change and market transformation by showcasing the beauty and value of WaterSmart landscapes, products and services. The tools and resources developed by the Water Authority are described below.

WaterSmartSD Website

In 2013, the Water Authority launched a comprehensive water conservation website as an online resource to inspire, educate, and empower the region's residents to make water-efficient lifestyle choices. The website, WaterSmartSD.org, features information about device and other incentives, tools, and programs designed to help make the most of the region's limited water supplies. The site is organized to provide content relevant to the residential and business sectors.

The website also features news items and events, videos, a photo gallery highlighting successful WaterSmart landscaping projects, case studies and other information about indoor and outdoor water-use efficiency. It includes conservation tips and answers to frequently asked questions, along with links to helpful tools such as a residential water-use calculator, free garden design software and residential landscape design templates. The Water Authority updates WaterSmartSD.org regularly and visitors can sign up for automatic notifications relevant to their areas of interest.

eGuide to a WaterSmart Lifestyle

The eGuide to a WaterSmart Lifestyle is an online magazine that covers a wide array of topics, including landscape design, water-efficient plants, outdoor rooms, finding and fixing leaks, healthy soil, smart buys on plumbing fixtures, landscape maintenance and drought survival for gardens. It offers everything from design ideas for creating themed planting zones to strategies for using graywater at homes and irrigating efficiently.

A Homeowner's Guide to a WaterSmart Landscape

A Homeowner's Guide to a WaterSmart Landscape is the companion guide to the Water Authority's award-winning WaterSmart Landscape Makeover Series. This no-cost guide offers instructions for homeowners who want to make their landscapes more water-efficient. The guide reflects the state's Model Water-Efficient Landscape Ordinance standards and explains the principles of a WaterSmart landscape design and irrigation, climate-appropriate plants and BMPs.

Water Conservation Garden

The Water Conservation Garden opened in 1999 to educate the public about the steps they can take to conserve water in landscapes. It occupies nearly 6 acres adjacent to Cuyamaca College in the eastern part of the Water Authority's service area. The Garden showcases 16 different

mini-gardens and exhibits and provides school-education programs and outreach, low-water-use classes and workshops, and community events. The Water Authority joined the Garden's Joint Powers Authority in 2001 and continues to support its efforts to promote water efficiency in the landscape sector.

San Diego Botanic Garden

The San Diego Botanic Garden is in the north-coastal area of the County. The Water Authority supports its vision through a corporate sponsorship. The mission of the Botanic Garden is to promote sustainable use of natural resources. Low-water-use plants and water-saving technologies and displays make up the majority of the Botanic Garden. In an effort to reduce outdoor water use in the region, the Botanic Garden also provides classes on water conservation and garden tours throughout the year in an effort to reduce outdoor water use in the region.

WaterSmart Landscaping in San Diego County

The WaterSmart Landscape web portal links viewers to an extensive plant database, inspirational gardens, tips and other landscape-related resources.

3.3 Public Outreach

The Water Authority has consistently promoted water-use efficiency programs through its communications and outreach channels as part of its overall long-term strategy to improve the reliability of the region's water supplies by diversifying its water supply sources and advancing conservation. In addition, during times of shortage or drought, the Water Authority dedicates additional financial and staff resources to public awareness campaigns that call upon the public to take more immediate actions to save water.

Promoting WaterSmart Programs

For the past 10 years, the Water Authority implemented focused outreach efforts on building awareness and public acceptance for water-use efficiency as a desirable lifestyle and a permanent civic responsibility through promoting the Water Authority's WaterSmart-branded outreach programs and classes. The Water Authority also promoted participation in Metropolitan's SoCal WaterSmart and Bewaterwise.com rebate programs. Staff promotes these resources primarily through its member agencies, media relations, community relations activities (such as attending special events and making presentations to community groups), targeted advertising, promotional materials, videos, electronic newsletters, social media and innovative public-private partnerships. During this time frame, the Water Authority has expanded its social media tools to include Facebook, Twitter, YouTube, Instagram, Nextdoor, and LinkedIn. In addition, the WaterSmartSD.org website has been a popular destination for regional customers looking for water-saving incentives, education and resources.

“When in Drought” Outreach

In early 2014, as water supply conditions worsened, regional drought-response outreach was implemented as called for under the Water Authority’s Water Shortage and Drought Management Plan. Water Authority staff developed an outreach program themed “When in Drought: Save Every Day, Every Way,” to increase awareness of the need for increased voluntary water conservation and to enhance public understanding of ratepayer investments in projects and public commitment to water efficient practices have reduced the San Diego region’s vulnerability to shortages from drought conditions. The outreach was partially supported in 2014 and 2015 by state Proposition 50 grant funds. In May 2015, after the state imposed historic water use restrictions, the Water Authority Board responded by authorizing an additional \$1 million to support enhanced outreach and water conservation programs designed to help its member agencies comply with mandated water-use reduction targets. In 2016, the Water Authority was awarded \$1.1 million in Proposition 84 Final Round grant funds to sustain enhanced drought response outreach efforts.

The comprehensive “When in Drought” outreach and education program deployed a comprehensive array of communications and outreach tactics, including paid advertising, media relations, website communications, electronic newsletters, social media posts, videos, a speakers’ bureau, school education programs, community partnerships and promotions, and government relations. Outreach materials were translated into Spanish, and staff participated in several community-based events to ensure reach into a diverse set of audiences around the region. The Water Authority also launched a “When in Drought” smartphone app in August 2015 to make it more convenient for the region’s residents to report potential incidents of water waste to their retail water district. Public opinion and behavior changes were measured using via telephone and web-based surveys.

As water supply conditions improved in spring 2016, the Water Authority, in coordination with its member agencies, began transitioning to longer-term behavioral outreach promoting water-use efficient practices as a desirable and permanent way of life in the San Diego region. Overall goals of this ongoing effort include promoting public awareness and use of regionally available water-use efficiency programs, tools and other resources, and encouraging residents and businesses to continue to exhibit “water smart” behaviors and avoid water-wasting practices prohibited statewide.

The Water Authority consistently promotes water efficient lifestyle practices and an appreciation for regional water supply investments through a range of activities, including the following:

- Administering a Citizens Water Academy that educates emerging leaders on regional water issues, including the importance of water-use efficiency and prudent investments in water supply reliability, through in-depth and engaging interactions with senior Water Authority staff and tours of key regional water facilities

- Conducting research on the public's knowledge of water issues and attitudes toward water-efficient practices
- Supporting water conservation and other supply management and development strategies
- Using social media, electronic newsletters, community events, and speaker's bureau presentations
- Promoting consumer education on water efficient landscape practices through support of the Water Conservation Garden and the San Diego Botanic Garden
- Developing and providing K-12 school education materials and programs, such as assemblies and on-line teaching programs

Other Outreach Efforts

Other Water Authority outreach efforts are listed below.

- Outreach Programs and Tactics:
 - Water-Saving Superstars
 - Fix a Leak Week
 - How Low Can You Go?
 - Drought Bucket Promotion (5,000 buckets distributed)
 - Live WaterSmart
 - San Diego - Brought to You by Water
 - Brewing Month (February 2019)
 - Faces of the Water Industry (October 2019)
 - Trust the Tap (2020)
- Media Relations
 - Dear Drought Fighter column in the *San Diego Union-Tribune*
 - *San Diego Union-Tribune* Home + Garden Article Series beginning in September 2017
- Civic/Community Partnerships
- Social Media
 - Facebook, Twitter, Instagram, LinkedIn, YouTube, Nextdoor
 - Live WaterSmart Photo Contest (debuted 2017)
 - Summer of Social Influence (debuted April 2018)
 - Brought to You by Water Photo Contest (debuted 2018)
- Communications
 - WaterSmartSD.org, the Water Authority's conservation website
 - Joint Public Information Council/Conservation Coordinators
 - WaterSource e-Newsletter
 - *Water News Network* (debuted September 2018)

- *A regular feature on the website included articles on homeowners who have converted their turf to Watersmart landscaping*
- Online Annual Reports
- Support for member agencies that sponsor local landscape contests

Water-Use Efficiency Legislative Sponsorship

The Water Authority has been a statewide leader in sponsoring legislation to improve water-use efficiency standards since 1991. Many bills sponsored by the Water Authority have set precedent and been instrumental in the development of new strategies in water resource management, including advancement of standards for high-efficiency toilets and residential clothes washers, and water-efficient landscapes. Most recently, and since the 2015 UWMP, the Water Authority has sponsored three measures. Water-use efficiency legislation sponsored by the Water Authority and signed into law in recent years focuses on updates to the Model Water Efficient Landscape Ordinance provisions in statute and codifies several consensus recommendations of DWR’s Independent Technical Panel to improve landscape water use efficiency in urban areas. Water Authority-sponsored landmark water-use efficiency laws are shown in Table 3-3.

Table 3-3. Water Authority Sponsored Landmark Water-Use Efficiency Laws

Toilets and Clothes Washer Standards	Statewide Requirement for Water Meters
SB 1224 (Killea, 1991) AB 952 (Kelley, 2001) AB 1561 (Kelley, 2002)	AB 514(Kehoe, 2003) AB 2572 (Kehoe, 2004) SB 1050 (Natural Resources & Water, 2007)
Statewide Landscape Irrigation Standards	Statewide Conservation Best Management Practices
AB 2717 (Laird, 2004) AB 1881 (Laird, 2006) AB 2515 (Weber, 2016)	SB 553 (Kelley, 2000) AB 1465 (Hill, 2009) AB 2371 (Carrillo, 2018)
Artificial Turf in Homeowners Associations	Urban Water Management Plans
AB 349 (Gonzales, 2015)	AB 2067 (Weber, 2014)

3.4 Conclusion

Water-use efficiency will continue to play a central role in the Water Authority’s efforts to maximize the reliability of the region’s water supply through diversification. The achievements in water conservation discussed in this section provide a foundation for the existing and future measures, programs, and policies. Moving forward, the Water Authority will support its member agencies’ efforts to comply with the water-use efficiency standards required under the long-term state water-use efficiency framework through various means, including a continued emphasis on behavioral change and market transformation.

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SECTION 4 WATER AUTHORITY SUPPLIES

4.1 Introduction

Historically, the Water Authority has relied solely on imported water supplies purchased from Metropolitan to meet the needs of its member agencies. Metropolitan’s supplies come from two primary sources, the State Water Project and the Colorado River. After experiencing severe shortages from Metropolitan during the 1987 to 1992 drought, the Water Authority began methodically pursuing actions to diversify the region’s supply sources. Comprehensive supply and facility planning over the last 20-plus years provided the direction for implementation of these actions.

This section documents the Water Authority’s existing and projected supply sources. For the purpose of analysis as presented in this 2020 UWMP, supplies are separated into one of three categories: verifiable, additional planned, or conceptual.

“Verifiable” projects are those with substantial evidence and adequate documentation regarding implementation and supply use. The Water Authority or member agencies have identified verifiable projects that have achieved a level of certainty in their planning and implementation. Examples of certainty include completed environmental documents, permits issued, or signed construction contracts. Verifiable supplies are included in water supply assessments and verifications prepared by retail water agencies and used by the cities and county in their land use decisions regarding available water supplies for growth under SB 221 and SB 610. Verifiable projects are used in the Water Authority’s reliability assessment in *Section 9 Water Supply Reliability*.

“Additional planned” projects are those that the Water Authority or member agencies are actively pursuing and currently funding, but these projects do not rise to the level of verifiable for implementation. Additional planned projects may be projects member agencies have studied for feasibility and continue to fund advanced planning efforts. Additional planned projects are in *Section 10 Scenario Planning – Managing an Uncertain Future*, as potential strategies to manage future supply uncertainty planning scenarios.

“Conceptual” projects are those considered to be in the pre-planning and pre-feasibility analysis phases, where the projects have not progressed to a point where the project yield can be factored into reliability assessments or uncertainty planning for this 2020 UWMP.

The Water Authority developed a *Water Resources Plan* in 1993 and updated this plan in 1997 (Water Authority, 1993; 1997). This *Water Resources Plan* emphasized the importance of developing local supplies and core water transfers. Consistent with direction provided in the 1997 plan update, the Water Authority entered into a Water Conservation and Transfer Agreement in 1998 with IID, an agricultural district in neighboring Imperial County. Through this transfer agreement, the Water Authority began receiving conserved water from IID after the

execution of the Quantification Settlement Agreement (QSA) in 2003, first at 10,000 AF with the volume increasing per the agreement terms year-over-year until it will reach 200,000 AFY in 2021. The Water Conservation and Transfer Agreement supply source is considered a verifiable Water Authority supply.

Also as part of the QSA, the Water Authority contracted for 77,700 AFY of conserved water from projects to line the All-American Canal (AAC) and Coachella Canal (CC). Deliveries of this conserved water from the CC reached the region in 2007, and deliveries from the AAC reached the region in 2010. Supplies from the canal lining projects are considered verifiable Water Authority supplies.

To further diversify regional supplies, the Water Authority's 2005 and 2010 UWMPs identified seawater desalination as a potential supply for meeting future demands. In keeping with the objective of these plans, the Water Authority entered into a formal Water Purchase Agreement with Poseidon Water, a private investor-owned company, in November 2012. The Water Purchase Agreement details commercial and financial terms for the development and purchase of desalinated ocean water produced at the Carlsbad Desalination Plant. Construction began in 2012 and commercial operation began in December 2015. This facility is currently in commercial operation and is capable of producing up to 56,000 AFY. The Carlsbad Desalination Plant is a verifiable supply.

4.2 Water Authority-Imperial Irrigation District Water Conservation and Transfer Agreement

On April 29, 1998, the Water Authority signed a historic agreement with IID for the long-term transfer of conserved Colorado River water to San Diego County. The Water Authority-IID Water Conservation and Transfer Agreement (Transfer Agreement) is the largest agriculture-to-urban water transfer agreement executed in U.S. history. Colorado River water was initially conserved via temporary farmland fallowing, which was allowed through 2016. Water is currently conserved through on-farm and system efficiency programs and is then transferred to the Water Authority for use in the San Diego region. On-farm conservation is implemented by Imperial Valley farmers who voluntarily participate in the program by implementing projects that conserve water on their farms. System efficiency projects are implemented by IID through development of capital projects that conserve water by improving the efficiency of IID's large distribution system. Through the Transfer Agreement, the Water Authority is entitled to Priority 3(a) water, which is a higher priority water right than Metropolitan's Priority 4 apportionment.

4.2.1 Implementation Status

On October 10, 2003, the Water Authority and IID executed an amendment to the original 1998 Transfer Agreement. This amendment modified certain aspects of the Transfer Agreement to be consistent with the terms and conditions of the 2003 QSA and other related agreements. It also modified other aspects of the agreement to lessen the environmental impacts of the transfer of conserved water. This amendment was expressly contingent on the approval and

implementation of the QSA, which was also executed on October 10, 2003 (for more information about the QSA, see *Section 6.2.1 Colorado River*).

On November 5, 2003, IID filed a complaint in Imperial County Superior Court seeking validation of 13 contracts associated with the Transfer Agreement and the QSA. Imperial County and various private parties filed additional suits in Superior Court, alleging violations of the California Environmental Quality Act (CEQA), the California Water Code, and other laws related to the approval of the QSA, the water transfer, and related agreements. The lawsuits were coordinated for trial. The IID, Coachella Valley Water District, Metropolitan, the Water Authority, and the State defended these suits, which sought validation of the contracts. In January 2010, a California Superior Court judge ruled that the QSA and 11 related agreements were invalid because one of the agreements created an open-ended financial obligation for the State, in violation of California's constitution. The QSA parties appealed this decision, and a stay of the trial court judgment was issued during the appeal. In December 2011, California's Third District Court of Appeal reversed the lower court ruling that invalidated the Transfer Agreement and QSA. The appeals court remanded several issues to the trial court, including questions about whether the QSA was properly processed under CEQA. In July 2013, a Sacramento Superior Court judge entered a final judgment validating the QSA and rejecting all of the remaining legal challenges. The judge affirmed all of the contested actions, including the adequacy of the environmental documents prepared by IID. In May 2015, the state Court of Appeal issued a ruling that dismissed all remaining appeals.

4.2.2 Expected Supply

Water deliveries to the County via the transfer began in 2003 with an initial transfer of 10,000 AF. The Water Authority receives transfer water each year according to a water delivery schedule contained in the Transfer Agreement. In 2019, the Water Authority received 192,500 AF of water which includes 2,500 AF of early transfer water. The quantities are scheduled at 205,000 AF in 2021 and 202,500 AF in 2022; the quantities will then remain fixed at 200,000 AF for the duration of the Transfer Agreement. A cumulative 10,000 AF of additional water called early transfer water is included from 2019 through 2021 (i.e. 2,500 AF in 2019; 5,000 AF in 2020; and 2,500 AF in 2021) per the Transfer Agreement. The initial term of the Transfer Agreement is 45 years, with a provision that either agency may extend the agreement for an additional 30-year term.

During dry years, when water availability is low, conserved water will be transferred under IID's Colorado River rights, which are among the most senior in the Lower Colorado River Basin. Without the protection of these rights, the Water Authority would suffer greater delivery cutbacks when supplies are limited from Metropolitan.

4.2.3 Transportation

The Water Authority entered into a water Exchange Agreement with Metropolitan on November 10, 1998, to convey Water Authority–IID transfer water from the Colorado River to

the County. The Exchange Agreement was amended and restated as part of the QSA on October 10, 2003. Under the Exchange Agreement, Metropolitan takes delivery of both the IID conserved water and the canal lining supplies through its CRA and delivers a like quantity and quality of water to the Water Authority. Per the Exchange Agreement, the Water Authority agrees to pay Metropolitan's lawful wheeling rate for each acre-foot of exchange water transported. In December 2017, the Water Authority Board approved an extension of the Exchange Agreement from 35 years to the full 45 years of the Transfer Agreement with IID. If the Transfer Agreement is extended another 30 years beyond 2047, as allowed by the existing Transfer Agreement with mutual consent of the parties, the Water Authority would have to consider options for conveyance of that water and is currently studying those options. Under the existing Exchange Agreement, water transfer supplies are delivered in equal monthly installments.

4.2.4 Cost/Financing

The costs associated with the water transfer are financed through the Water Authority's rates and charges. In the Transfer Agreement between the Water Authority and IID, the price for transfer water started at \$258/AF and increased by a set amount for the first seven years. Early transfer water is subject to separate pricing terms. In December 2009, the Water Authority and IID executed a fifth amendment to the Transfer Agreement that set the price per acre-foot for transfer water for calendar years 2010 through 2015, beginning at \$405/AF in 2010 and increasing to \$624/AF in 2015. For calendar years 2016 through 2034, the unit price is to be adjusted using an agreed-upon index. Beginning in 2035, either the Water Authority or IID can, if certain criteria are met, elect a market rate price through a formula described in the Transfer Agreement. The amendment also required the Water Authority to pay IID \$6 million in 2009 and another \$50 million in 2010.

The Water Authority provided \$40 million to help offset potential socioeconomic impacts associated with temporary land fallowing. IID will credit the Water Authority \$10 million of those funds during years 16 through 45 of the Transfer Agreement. In 2007, the Water Authority prepaid IID an additional \$10 million for future deliveries of water, which IID repaid in full in 2018.

As part of implementation of the QSA and water transfer, the Water Authority also entered into an environmental cost-sharing agreement. Under the environmental cost-sharing agreement's terms, the Water Authority is contributing \$94 million to fund environmental mitigation projects through the QSA Joint Powers Authority and has completed its \$12 million obligation to the Salton Sea Restoration Fund.

The 2003 Exchange Agreement between Metropolitan and the Water Authority provides for transportation of Colorado River water from the canal lining projects and the IID water transfer through Metropolitan facilities. Under the Exchange Agreement, the initial price to transport the Colorado River water was set at \$253/AF. Thereafter, the Water Authority agreed to pay

Metropolitan’s lawful wheeling rate for transportation of these water supplies at a price equal to the charge or charges set by Metropolitan’s Board of Directors pursuant to applicable laws and regulation, and generally applicable to the conveyance of water by Metropolitan on behalf of its member agencies. Metropolitan’s published transportation charge in 2020 was \$482/AF.

After the completion of its 2010 UWMP, the Water Authority took legal actions challenging Metropolitan’s rates for calendar years 2011 through 2020. In September 2017, a Court of Appeals ruling was finalized for the 2010 and 2012 cases, that among other things ruled Metropolitan illegally charged the Water Stewardship Rate to transport Water Authority independent Colorado River supplies from 2011 to 2014. The ruling also determined that Metropolitan under-calculated the Water Authority’s preferential right to Metropolitan water by approximately 100,000 AF of water per year. In February 2020, after securing more than \$350 million in water supply project agreements, the Water Authority Board approved the dismissal of certain claims in the litigation. In August 2020, as part of the remand, a trial court awarded the Water Authority about \$44.4 million for damages, including pre- and post-judgment interest, for the 2010 and 2012 cases. In the same month, the same court also granted the Water Authority’s motion to lift the stayed cases challenging calendar year rates for 2015 through 2018 to allow the Water Authority to dismiss without prejudice certain claims and amend the complaints. The Water Authority did not challenge Metropolitan’s 2021 and 2022 rates, which were adopted in April 2020.

4.2.5 Written Contracts or Other Proof

Appendix D contains a list of the specific written contracts, agreements, and environmental permits associated with implementation of the Water Authority-IID Transfer.

4.2.6 Existing and Future Supplies

Based on the terms and conditions in the Transfer Agreement, Table 4-1 shows the anticipated delivery schedule for conserved transfer water in five-year increments. There is adequate documentation to demonstrate the availability of this supply; therefore, the supply yields shown in Table 4-1 will be included in the reliability analysis found in *Section 9 Water Supply Reliability*.

**Table 4-1. Existing and Projected Water Authority–IID Transfer Supplies
(Normal Year, AFY)**

2020	2025	2030	2035	2040	2045
192,500	200,000	200,000	200,000	200,000	200,000

4.3 All-American Canal and Coachella Canal Lining Projects

As part of the QSA and related contracts, the Water Authority contracted for 77,700 AFY of conserved water from projects that lined portions of the AAC and CC. The projects reduced the loss of water that occurred through seepage, and the conserved water is delivered to the Water

Authority. This conserved water will provide the San Diego region with an additional 8.5 million AF over the 110-year life of the agreement.

4.3.1 Implementation Status

The CC lining project constructed approximately 35 miles of parallel, concrete lined canal next to the original CC canal. Although construction completed in 2006, deliveries of conserved water to the Water Authority began in 2007. The AAC lining project constructed approximately 23 miles of parallel, concrete lined canal adjacent to the original AAC, which was completed in 2010 when deliveries of conserved water to the Water Authority began.

4.3.2 Expected Supply

The AAC lining project makes 67,700 AF of Colorado River water per year available for allocation to the Water Authority and San Luis Rey Indian water rights settlement parties. The CC lining project makes 26,000 AF of Colorado River water available each year for allocation. The 2003 Allocation Agreement provides for 16,000 AFY of conserved canal lining water to be allocated to the San Luis Rey Indian water rights settlement parties. The remaining amount (i.e., 77,700 AFY) is to be available to the Water Authority each year. The Water Authority will also receive any remaining portion of an available 4,850 AFY that is not needed for designated environmental purposes associated with the CC lining project. Under the existing agreements, annual canal lining supplies are delivered in equal monthly installments. According to the Allocation Agreement, IID has call rights to a portion (5,000 AFY) of the conserved water upon termination of the QSA for the remainder of the 110 years of the Allocation Agreement and upon satisfying certain conditions.

4.3.3 Transportation

The 2003 Exchange Agreement between the Water Authority and Metropolitan provides for the delivery of the conserved water from the canal lining projects. Under the Exchange Agreement, Metropolitan takes delivery of both the Water Authority's IID water transfer and canal lining supplies through its CRA, and delivers to the Water Authority a like quantity and quality of water. The Water Authority agrees to pay Metropolitan's lawful wheeling rate for each acre-foot of exchange water delivered. In the Exchange Agreement, Metropolitan agrees to deliver the canal lining water for the term of the Water Authority's Allocation Agreement with IID (i.e., 110 years). Under the existing Exchange Agreement, canal lining project supplies are delivered in equal monthly installments.

4.3.4 Cost/Financing

Under California Water Code Section 12560 et seq., the Water Authority received \$200 million in state funds for construction of the canal lining projects. In addition, \$20 million was made available from Proposition 50 and \$36 million was made available from Proposition 84. The Water Authority was responsible for additional expenses above the funds provided by the state.

In accordance with the Allocation Agreement, the Water Authority is responsible for a proportionate share of the net additional operation, maintenance, and repair costs for the lined canals. Any costs associated with the canal lining projects are to be financed through the Water Authority's rates and charges.

Transfer of water from the canal lining projects occurs via Metropolitan's system under the 2003 Exchange Agreement between Metropolitan and the Water Authority, as described in *Section 4.2.4 Cost/Financing* above.

4.3.5 Written Contracts or Other Proof

Appendix D contains a list of the specific written contracts, agreements, and environmental permits associated with implementation of the canal lining projects.

4.3.6 Existing and Future Supplies

Table 4-2 shows the anticipated delivery schedule of conserved supplies from the canal lining projects in five-year increments. Adequate documentation exists to demonstrate the availability of this supply; therefore, the reliability analysis found in *Section 9 Water Supply Reliability*, will show the supply yields presented in Table 4-2.

Table 4-2. Projected Supply from Canal Lining Projects (Normal Year, AFY)

	2020	2025	2030	2035	2040	2045
CC Lining Project ¹	21,500	22,500	22,500	22,500	22,500	22,500
AAC Lining Project ²	56,200	56,200	56,200	56,200	56,200	56,200
Total:	77,700	78,700	78,700	78,700	78,700	78,700

¹ The project was completed in 2006 and deliveries started in 2007; includes 21,500 AF, and starting in 2025, the projected supply includes and estimated 1,000 AF of additional supply that may be available if not used for environmental mitigation associated with the CC lining project.

² The project was completed and deliveries started in 2010.

4.4 Metropolitan Water District of Southern California

The Water Authority's imported water supply sources include purchases from Metropolitan. This is separate from and in addition to the Water Authority-IID Transfer supplies and CC and AAC lining supplies. *Section 6, Metropolitan Water District of Southern California*, contains detailed information about Metropolitan's supplies. Information about Water Authority projected demands on Metropolitan, as provided by Metropolitan, can be found in Appendix G.

4.5 Carlsbad Desalination Plant

Seawater desalination in the County helps the region in diversify its water resources, reduces dependence on imported supplies, and provides a locally treated, drought-proof water supply. The Carlsbad Desalination Plant is a seawater desalination plant and associated conveyance pipeline that was developed by Poseidon, a private investor-owned company that owns the plant. The Carlsbad Desalination Plant, located at the Encina Power Station in Carlsbad, began

commercial operation on December 23, 2015, and can provide a highly reliable local supply of up to 56,000 AFY for the region. Of the total Carlsbad Desalination Plant production, 6,000 AF is considered a member agency local supply, which is described further in Section 5.6.1.

As a result of the forthcoming Encina Power Station decommissioning and termination of the once-through cooling water system and seawater intake pumps, the Carlsbad Desalination Plant is transitioning from co-located operations with the Encina Power Station to permanent stand-alone operations. Recent changes to the existing intake and discharge operations include a direct lagoon intake and fish-friendly pumps; it will also include future construction of new 1 mm screens for seawater process water or brine dilution water. In addition, there is the potential to increase annual average production capacity of the Carlsbad Desalination Plant to 61,600 AF as an adaptive management supply (subject to future supply conditions and future Board action). The potential 5,600 AF increment of additional seawater desalination supply from the Carlsbad Desalination Plant could be placed into service prior to 2025.

Each year, the Water Authority and Poseidon establish an estimated schedule of water deliveries from the Carlsbad Desalination Plant. The estimated delivery schedules account for variability in Water Authority demands throughout the year (i.e., generally lower water demands during winter months), projected Carlsbad Desalination Plant maintenance activities, and projected Water Authority system shutdowns and maintenance activities. In addition, supplies from the plant throughout the year can be impacted due to fluctuations in water quality in the Agua Hedionda Lagoon and unscheduled maintenance at the Carlsbad Desalination Plant.

4.5.1 Transportation and Energy

A 54-inch-diameter pipeline conveys product water from the Carlsbad Desalination Plant 10.5 miles east to the Water Authority's Second Aqueduct. The water is then conveyed 5 miles north to the Water Authority's Twin Oaks Valley WTP facility, where it is blended with treated imported water and subsequently distributed into the Water Authority's existing aqueduct system.

Energy used to treat and convey supplies from the Carlsbad Desalination Plant are not included in the Water Authority's energy intensity calculations (Appendix I) because this facility is owned by a private entity and the Water Authority does not have operational control over these supplies.

4.5.2 Cost/Financing

The Water Purchase Agreement between the Water Authority and Poseidon provides the terms whereby the Water Authority purchases the entire output from the Carlsbad Desalination Plant at a price based on the cost of production. For contract year 2018-19, the price was \$2,685 per AF (including conveyance pipeline debt service, Poseidon management fee, and temporary

standalone operations period charges). The Water Authority's water purchase costs are financed through Water Authority rates and charges.

4.5.3 Written Contracts or Other Proof

Appendix D lists the specific written contracts, agreements, and environmental permits associated with implementation of the Carlsbad Desalination Plant.

4.5.4 Existing and Future Supplies

Table 4-3 shows the existing (2016 to 2019) water supplies from the Carlsbad Desalination Plant in one-year increments.

Table 4-3. Existing Supply from Carlsbad Desalination Plant (AFY)*

2016	2017	2018	2019	2020
40,353	27,953	42,629	39,546	35,280

* Excludes local supplies for Vallecitos Water District and Carlsbad Municipal Water District

Table 4-4 shows the anticipated delivery schedule of supplies from the Carlsbad Desalination Plant in five-year increments. Adequate documentation exists to demonstrate the availability of this supply; therefore, the reliability analysis found in *Section 9, Water Supply Reliability*, will show the supply yields presented in Table 4-4.

Table 4-4. Projected Supply from Carlsbad Desalination Plant (Normal Year, AFY)

2025	2030	2035	2040	2045
50,000	50,000	50,000	50,000	50,000

4.6 Water Authority Dry-Year Supplies

In addition to Water Authority supplies expected during a normal water year, the Water Authority has also invested in carryover storage supplies to help achieve reliability in dry years and multiple dry years, as discussed in *Section 9.3, Dry Water Year Assessment*. The Water Authority's carryover storage supply program includes both in-region surface water storage and out-of-region groundwater storage in California's Central Valley. These verifiable dry-year storage supplies are described in detail in *Section 11, Water Shortage and Drought Planning*, and a list of the specific written contracts, agreements, and environmental permits associated with implementation of the Carryover Storage Program is in Appendix D.

4.7 References

San Diego County Water Authority. 1993. *1993 Water Resources Plan*.

San Diego County Water Authority. 1997. *1997 Water Resources Plan*.

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SECTION 5 MEMBER AGENCY SUPPLIES

5.1 Introduction

Local water resources developed and managed by the Water Authority's member agencies are critical to securing a diverse and reliable water supply for the region. Local projects reduce demands for imported water and provide member agencies with a drought-resilient supply. This section provides general information about local water resources being developed and managed by the Water Authority's member agencies. These supplies include surface water, groundwater, recycled water, potable water for reuse, desalinated seawater, and water transfers.

The Water Authority, working closely with its member agencies, took the following steps to update yields anticipated from member agencies' local supplies:

1. Provided member agencies with projected supply numbers included in the Water Authority's 2015 UWMP. The Water Authority asked member agencies to update the figures for their specific project(s) and separate these projects into three project categories: verifiable, additional planned, and conceptual. These categories are based on the stages of development defined in *Section 4 Water Authority Supplies*.
2. Prepared revised projections based on input from member agencies.
3. Presented revised supply numbers to member agencies at several meetings and continued working with member agencies ensure these figures accurately reflected member agency project implementation efforts.
4. Distributed the administrative draft of the 2020 UWMP to member agencies for review, which gave member agencies another opportunity to review/revise updated local supply figures prior to Water Authority Board approval.

Before 1947, the San Diego region relied on local surface water runoff in normal and wet weather years and on groundwater pumped from local aquifers during dry years when stream flows were reduced. As the economy and population grew, local resources became insufficient to meet the region's water supply needs. From the 1950s onward, the region became increasingly reliant on imported water supplies. Since 1980, a range of 5% to 36% of the water used in the Water Authority's service area has come from local sources, primarily from surface water reservoirs with yields that vary directly with annual rainfall. A growing share of local supply comes from recycled water, groundwater recovery, potable reuse, and seawater desalination projects. Yield from these projects is considered drought-resilient since the projects are primarily independent of precipitation. Additionally, local supplies include water transfers with implementation of the San Luis Rey Water Transfer. In fiscal year 2020, total local water sources provided 28% of the water used in the Water Authority's service area.

















5.2 Surface Water Supply

5.2.1 Surface Water Description

The regional surface water yield is supported by 24 surface reservoirs with a combined capacity of 722,793 AF (see Table 5-1 and Figure 5-1). These reservoirs are located in seven of San Diego County's nine coastal watersheds. Runoff in these watersheds occurs at the crest of the county's Peninsular Range and drains into the Pacific Ocean. The oldest of these reservoirs, Cuyamaca, was constructed in 1887. Table 5-1 lists the 24 reservoirs together with their associated operating agency and storage capacity.

Olivenhain Reservoir, completed in 2003, is the region's newest reservoir. It is part of the Water Authority's ESP and has a storage capacity of 24,774 AF. The ESP adds 90,100 AF of additional storage capacity and is designed to protect the region from disruptions in the water delivery system. In addition, the 2002 Regional Water Facilities Master Plan identified an opportunity to augment the ESP with a carryover storage component at San Vicente Reservoir. The Water Authority completed the ESP and CSP portion of the San Vicente Dam Raise in mid-2014, which provides an additional 157,100 AF of water storage capacity. Refer to *Section 11.2.2 Emergency Storage Project* and *Section 11.4.1 Water Authority Carryover Storage Program* for additional information on the Water Authority's emergency and carryover storage.

Table 5-1. Major San Diego County Reservoirs

Agency (Owner)	Reservoir	Capacity (AF)
 Carlsbad Municipal Water District	Maerkle	600
 Escondido, City of	Dixon	2,606
Escondido, City of	Wohlford ^a	2,783
 Fallbrook Public Utility District	Red Mountain	1,335
Helix Water District	Cuyamaca	8,195
 Helix Water District	Jennings	9,790
 Poway, City of	Poway	3,432
 Rainbow Municipal Water District	Morro Hill	465
 Ramona Municipal Water District	Ramona	12,000
San Diego, City of	Barrett	34,806
 San Diego, City of	El Capitan	112,807
 San Diego, City of	Hodges ^b	13,401
 San Diego, City of	Lower Otay	47,067
 San Diego, City of	Miramar	6,682
San Diego, City of	Morena	50,694
 San Diego, City of	Murray	4,684
 San Diego, City of	San Vicente ^c	249,358
San Diego, City of	Sutherland	29,508
 San Dieguito Water District/Santa Fe Irrigation District	San Dieguito	883
 San Diego County Water Authority	Olivenhain	24,774
Sweetwater Authority	Loveland	25,400
 Sweetwater Authority	Sweetwater	28,079
Valley Center Municipal Water District	Turner	1,612
Vista Irrigation District	Henshaw	51,832
Total Capacity		722,793

 = Connected to Water Authority aqueduct system.

^aThe capacity volume accounts for lowered reservoir level at Lake Wohlford due to DWR Division of Safety of Dams safety issues.

^bThe capacity volume accounts for lowered reservoir level at Lake Hodges due to DWR Division of Safety of Dams safety issues and is in accordance with the 1998 Emergency Storage Project Agreement for the Joint Use of Lake Hodges Dam and Reservoir.

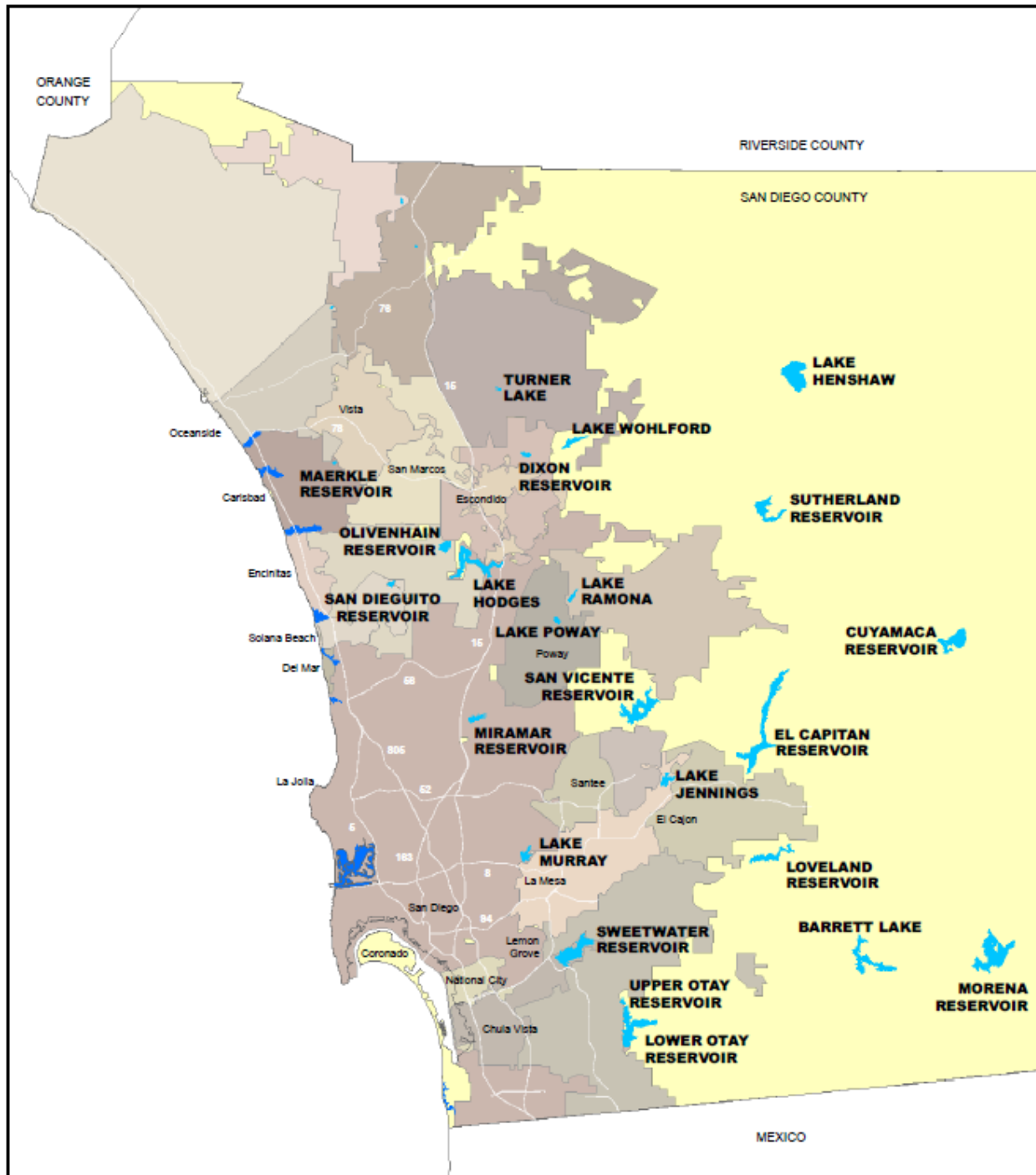
^cThe Water Authority has storage rights to 157,100 AF of capacity in San Vicente Reservoir (105,000 AF is designated as carryover storage; 52,100 AF is designated as emergency storage).

5.2.2 Surface Water Issues

Surface Water Management

The Water Authority's member agencies manage most of the region's reservoirs. The San Vicente Dam Raise was completed in mid-2014 and Carryover Storage Project water began to be stored a year later. Together with the city of San Diego, the Water Authority coordinates San Vicente operations to optimize the use of their respective storage pools. The Water Authority also coordinates storage in Lake Hodges with the City of San Diego in order to manage its pumped storage project. The Lake Hodges Pumped Storage Project delivers water uphill to Olivenhain Reservoir in off-peak hours, generating electricity during peak demand periods through a coordinated release schedule. Also, in coordination with its member agencies, the Water Authority manages the imported conveyance system to achieve the optimal use of local and imported water resources, which include the local reservoirs. To reduce the need for imported water purchases, the reservoirs are operated to maximize the use of this local supply. Local surface water supplies can also offset dry-year shortfalls in imported water. Maximizing local yield reduces losses due to evaporation and spills, but it also results in increased demands for imported water during dry years when imported water is more likely in short supply. Most member agencies maintain some portion of their storage capacity for emergency storage. To optimize the use of local storage, the Water Authority works with its member agencies through periodic storage agreements and through its annual *Aqueduct Operating Plan*, last published in June 2020 (Water Authority, 2020). Storage agreements allow for carryover storage to be placed in member agency reservoirs and to provide increased local storage capacity, which can be used during peaks on the aqueduct system. The aqueduct operating plans coordinate imported water deliveries and optimize reservoir fill opportunities. Local yield is maximized by the member agencies that operate the reservoirs.

Figure 5-1. Major San Diego County Reservoirs



Water Quality

See *Section 7 Water Quality*, for discussion of water quality issues related to the region's water supply.

5.2.3 Projected Surface Water Supplies

Surface water supplies can represent the largest single local resource in the Water Authority's service area. However, annual surface water yields can vary substantially due to fluctuating hydrologic cycles. Since 1990, annual surface water yields have ranged from a low of 4,100 AF in fiscal year 2015 to a high of 140,300 AF in fiscal year 1984. Water Authority member agencies' projected average annual surface water use is anticipated to increase slightly, from 44,237 AF in 2020 to 44,659 AF in 2045.

Appendix F, Table F-1 lists the individual reservoirs, expected yields, and basis for the water supply. Table 5-2 shows the projected average surface water supply in the Water Authority's service area; yields are used in the reliability analysis in *Section 9 Water Supply Reliability*.

Member agencies expect to include specific information on the projected yields from local reservoirs in their respective 2020 UWMPs.

Table 5-2. Projected Surface Water Supply (Normal Year, AFY)

2020	2025	2030	2035	2040	2045
44,237	43,957	43,957	44,659	44,659	44,659

5.3 Groundwater Supply

Groundwater accounts for a small percentage of the San Diego region's water supply portfolio. Although small, it is still an important resource that can contribute to reducing the region's future water demands. While the Water Authority does not currently hold groundwater basin rights, it does provide financial and technical assistance to member agencies that are evaluating, planning and implementing groundwater recovery projects. While some places like the South Bay rely heavily on their groundwater basins for a large portion of their water supply, other member agencies like Olivenhain Municipal Water District continue to study the potential for brackish groundwater recovery and treatment in their service areas. This section describes municipal groundwater development in the Water Authority's service area, regulatory requirements associated with groundwater production, and projected member agency yields. Inclusion of specific information required under the UWMP Act on groundwater basins and projects is expected in member agency 2020 UWMPs.

5.3.1 Groundwater Supply Description

Within the past five years, water supply agencies in the Water Authority's service area have utilized an annual average of approximately 22,300 AF of potable water supplies from groundwater. This total represents production from both brackish groundwater desalination facilities and municipal wells producing groundwater not requiring desalination. It does not

include production from privately owned water wells used for irrigation and domestic purposes, or several thousand AF of groundwater produced annually in the Warner Basin by the Vista Irrigation District. This groundwater is discharged into Lake Henshaw and is reported as local surface water supply by the City of Escondido and Vista Irrigation District.

In addition to providing a local supply to water agencies, groundwater is also a source of supply for numerous private well owners who draw on groundwater to help meet their domestic and agriculture water needs. In the Ramona area alone, over 1,000 privately owned wells provide a supplementary source of water for Ramona MWD customers. Similar domestic uses occur throughout the Water Authority's service area. These domestic supplies help offset demand for imported water provided by the Water Authority and its member agencies. Although significant, the amount of groundwater pumped by private wells cannot be accurately quantified or estimated in the Water Authority's service area. One agency, the Yuima MWD, did begin to report yield from its mutual water companies located within their service area in 2015, which totaled approximately 6,000 AF in normal year deliveries.

Groundwater production in the Water Authority's service area is limited by a number of factors, including the limited geographic extent of the more productive sand and gravel (i.e., alluvial) aquifers; the relatively shallow nature of most of the alluvial aquifers; lack of rainfall and groundwater recharge; and degraded water quality resulting from human activities, such as septic tank use.

Shallow and narrow river valleys filled with alluvial sand and gravel deposits are characteristic of the more productive groundwater basins in the San Diego region. Outside of these more productive aquifers, groundwater is developed from fractured crystalline bedrock and semi-consolidated sedimentary deposits that occur throughout the region. However, these aquifers have limited yield and storage and are best suited for meeting domestic water needs that do not require higher flow rates. Figure 5-2 shows the locations of the principal alluvial groundwater basins in the Water Authority's service area.

Although groundwater supplies are less plentiful in the San Diego region than in some other areas of California, such as the Los Angeles Basin in Southern California and the Central Valley in Northern California, the Water Authority believes that sufficient undeveloped brackish groundwater supplies exist that could help meet a greater portion of the region's future water demand. Several agencies in the Water Authority's service area have identified potential projects that may provide several thousand AF of additional groundwater production in the coming years. These projects are summarized below.

Figure 5-2. Alluvial Groundwater Basins



Groundwater Extraction and Disinfection Projects

Groundwater that can be extracted and used as a potable water supply with little more than disinfection generally occurs outside the influence of human activities and within the upper reaches of the region's east-west trending watersheds. Wells producing higher-quality water are operated by MCB Camp Pendleton (i.e., the Santa Margarita River watershed) and the Sweetwater Water Authority (i.e., the San Diego Formation aquifer). The Vista Irrigation District also operates numerous high-quality extraction wells in the Warner Basin, located in the upper San Luis Rey River watershed. The water from these wells is discharged to Lake Henshaw and eventually to the San Luis Rey River where it is then diverted farther downstream for use in Escondido and elsewhere. The unit cost of water produced from simple groundwater extraction and disinfection projects is low and generally well below the cost of imported water. Although a substantial amount of higher-quality groundwater in the Water Authority's service area is already used by its member agencies, the primary focus for future local groundwater development is brackish groundwater recovery and recharge projects.

Brackish Groundwater Recovery Projects

Groundwater high in salts, total dissolved solids (TDS) and other contaminants, which requires advanced treatment prior to potable use, is typically found in shallow basins in the downstream portions of watersheds. Brackish groundwater recovery projects use membrane technology, and principally reverse osmosis, to treat extracted groundwater to potable water standards. The City of Oceanside's 6.4-MGD capacity Mission Basin Desalter and the Sweetwater Authority's existing 10-MGD Richard A. Reynolds Groundwater Desalination Facility are the only currently operating brackish groundwater recovery and treatment facilities in the Water Authority's service area. The Richard A. Reynolds Groundwater Desalination Facility expansion was completed in 2017 and doubled the facility's pre-existing production capability. The facility expansion provides potable water to the Sweetwater Authority and the City of San Diego. Several member agencies are also considering the feasibility of new groundwater recovery and treatment facilities. Unit costs for brackish groundwater recovery projects are considerably higher than those for simple groundwater extraction and disinfection projects due to the additional treatment requirements and the cost of concentrate (i.e., brine) disposal. However, where economical options exist for disposal of brine, this type of groundwater project has proven to be an economically sound water-supply option.

Groundwater Recharge and Recovery Projects

Artificial recharge and recovery projects, also referred to as conjunctive-use projects, can increase groundwater basin yields by supplementing the natural recharge process. Conjunctive-use projects divert water supplies to percolation basins or injection wells to supplement natural rainfall runoff recharge. Captured rainfall runoff, recycled water, imported water, or a combination these sources can be used to recharge groundwater basins when water levels have been lowered sufficiently by pumping. Groundwater basins can be operated similarly to surface

water reservoirs, and can supply stored water if imported deliveries are limited due to high demand, supply and facility constraints, or some combination of these constraints. The Fallbrook Public Utility District and the MCB Camp Pendleton are undertaking a joint conjunctive use project that will increase the sustainable yield of the Lower Santa Margarita River Basin. Another example of a planned groundwater recharge project is the City of Oceanside's Pure Water Program. Phase I of this project will recharge up to 3,360 AFY of full advanced treated water into the Mission Basin Aquifer. This groundwater will be treated at the existing Mission Groundwater Purification Facility to supplement the City of Oceanside's potable water supply.

5.3.2 Groundwater Issues

Local water agencies often need to consider a multitude of issues during the planning, permitting, design, construction and operation of a groundwater project. The issues can include dealing with hydrogeological uncertainties, high upfront study and subsurface investigation costs, higher unit costs associated with brackish groundwater recovery and treatment, project funding considerations, water rights, regulatory and environmental concerns, and possible contamination of groundwater that might occur after the project is constructed and facilities are brought online. Although these issues in the past have discouraged decision makers and have limited groundwater development in the County, state-wide drought conditions and water supply reliability concerns are prompting renewed consideration of the viability of local groundwater development and cleanup projects for the region.

Hydrogeological and Environmental Impact Uncertainty

Significant resources must be expended prior to determining the feasibility of a project in groundwater basins not recently used as a source of a municipal water supply by an agency. There may be a general lack of information regarding issues such as the nature of aquifer materials, whether there are existing wells and groundwater production, water quality, and potential impact of pumping to riparian habitat. Subsurface exploration and field investigations can be costly and time consuming. In addition, data management and use generally require developing costly large-scale numerical models. These issues, in conjunction with financial considerations, often dictate how groundwater projects are developed, and how production is increased incrementally in a planned and managed fashion.

Economic and Financial Considerations

Because of the saline nature of the water and the presence of other contaminants in many of the groundwater basins in the County, the cost of groundwater development often requires demineralization and brine disposal facilities, which can be costly to construct and operate.

Institutional, Legal, and Regulatory Issues

Institutional and legal issues can also impact project development. Because groundwater basins often involve multiple water agencies and/or numerous private wells and water-right holders,

water rights and management authority should be addressed before a project progresses beyond the planning stage. Agencies are often reluctant to initiate groundwater development projects that go beyond the feasibility study stage unless jurisdiction and water rights issues are resolved beforehand. As challenging as those issues may be, recent drought conditions have prompted local agencies to attempt to resolve or overcome those barriers to groundwater development and proceed to groundwater project implementation.

Environmental Regulatory Constraints

Issues related to the environmental impacts that could potentially result from the fluctuation of groundwater levels when large quantities of groundwater are extracted are common to many of the groundwater projects proposed in the principal alluvial aquifers in the Water Authority's service area. These issues include potential impacts on endangered species habitat and groundwater-dependent vegetation. Impacts may occur if a project results in seasonal or long-term decreases in the depth of the groundwater. Although potential environmental impacts can generally be mitigated, mitigation costs can reduce the cost-effectiveness of a project.

Water Quality

Remediation of groundwater contamination presents a significant, ongoing operations and maintenance cost that presents barriers to project implementation. See *Section 7.6 Groundwater*, for additional information about water quality for groundwater supplies.

Funding

Grant funding for groundwater development has been steadily increasing. Title XVI of Public Law 102-575, the Reclamation Wastewater and Groundwater Study and Facilities Act, initially authorized the federal government to fund up to 25% of the capital cost of authorized water recycling projects. Public Law 104-266, the Reclamation Recycling and Water Conservation Act of 1996, also authorized two additional projects. One of those projects included funding for the City of Oceanside's Mission Basin Brackish Groundwater Desalting Demonstration Project (more funding information is in *Section 5.4.3 Encouraging Recycled Water Development*). Since 1994, the City of Oceanside's Mission Basin Brackish Groundwater Desalting Demonstration Project, along with the Sweetwater Authority's groundwater desalination facility, also benefitted from receiving Groundwater Recovery Program Funding from Metropolitan. To date, over \$13.9 million has been received from Title XVI for both the City of Oceanside's and Sweetwater Authority's projects.

Proposition 68, also known as the Natural Resources Bond or the California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018, was passed by California voters in June 2018. The bond measure authorized \$4.1 billion in funding for parks, environmental projects, water infrastructure projects and flood protections measure throughout California. The SWRCB will administer \$74 million from Chapter 11.1 for groundwater projects. Of the \$74 million, \$16 million will be set aside for project serving

severely disadvantaged communities (DACs). The Proposition 68 Guidelines were adopted by the SWRCB in August 2019. Along with local and federal funding sources, in 2007, the San Diego Integrated Regional Water Management (IRWM) Program submitted a grant proposal to DWR for Proposition 50 funds. As a result of this grant award, the Santa Margarita Conjunctive Use Project was awarded grant funding to enhance groundwater basin recharge and recovery to provide water supplies for both MCB Camp Pendleton and Fallbrook Public Utility District, which also resolved a long-standing water rights dispute. The project will provide approximately 3,100 AFY of new local supply from the Santa Margarita River by conjunctively managing the groundwater basin. Additionally, 1,380 acres of sensitive habitat will also be preserved along the river as a result of this project. In Southern California, wastewater, brackish water and urban runoff are high in TDS and other impurities, requiring advanced treatment to allow beneficial reuse.

The North San Diego County Cooperative Demineralization Project, funded under a Proposition 84 Round 1 Implementation Grant in 2011, focuses on developing new local water supplies and managing water quality issues by constructing an advanced water treatment facility (i.e., the San Elijo Water Reclamation Facility) to mitigate high-TDS water sources, increase beneficial reuse, and study the feasibility of brackish to potable water desalination in north San Diego County.

In 2014, also with Proposition 84 grant funding awarded through the San Diego IRWM Program, the Sweetwater Authority increased their production of potable water from desalinated brackish groundwater through the expansion of the Richard A. Reynolds Groundwater Desalination Facility for an additional 5,200 AFY. The project involved drilling five new wells in the San Diego Formation, construction of an additional 20,000 linear feet of conveyance and potable pipelines, and facility modifications. The desalinated groundwater produced by the project is added directly into the potable water supply, which will offset imported water purchases. Brine discharge from this project also helps maintain the brackish quality in the Sweetwater River estuary, protecting against incursion of non-native freshwater species. The project was implemented by the Sweetwater Authority, in partnership with the City of San Diego and was completed in 2017.

In 2017, the San Diego IRWM Program submitted a grant proposal in tandem with the Upper Santa Margarita Watershed and South Orange County IRWM region, for Proposition 1 DAC Involvement funds. This proposal included planning activities that involve DACs, economically distressed areas, and underrepresented communities in regional planning efforts to lay the groundwork for future implementation projects. One groundwater project in the San Diego region was funded as part of the proposal and it supports groundwater planning for Pauma Valley DACs and Tribes. The project involves forming a groundwater sustainability agency (GSA) for the San Luis Rey Groundwater Basin and consolidating the Lazy H Mutual Water Company to provide reliable water infrastructure to Lazy H's retail customers.

5.3.3 Sustainable Groundwater Management Act

In 2014, the California Legislature passed the Sustainable Groundwater Management Act (SGMA), making California the last state in the West to regulate groundwater. SGMA provides local agencies with a framework for managing groundwater basins in a manner that ensures basin resiliency, recognizing that groundwater is most effectively managed at the local level, and empowers local agencies to achieve basin sustainability within 20 years. Further, SGMA respects regional differences and provides for a tailored approach to planning. Other goals of SGMA include the following:

- Establish minimum standards for sustainable groundwater management
- Improve coordination between land use and groundwater planning
- Provide state technical assistance
- Create a mechanism for state intervention if, and only if, a local agency was not managing its groundwater sustainably
- Protect water rights

DWR's *Bulletin 118 Interim Update 2016, California's Groundwater—Working Toward Sustainability*, identified 515 alluvial groundwater basins in California (DWR, 2016). DWR conducted an initial prioritization of the identified 515 basins into four categories: high, medium, low, or very low. SGMA requires medium- and high- priority basins to develop groundwater sustainability agencies (GSAs), develop groundwater sustainability plans (GSP) and manage groundwater for long-term sustainability. The three SGMA-mandated basins in the County are San Luis Rey Valley (medium priority), San Pasqual Valley (medium priority), and Borrego Valley (high priority). A SGMA GSA can be a local agency, a combination of local agencies, or a county. It is the GSA's responsibility to develop and implement a GSP that considers all beneficial uses and users of groundwater in the basin. Figure 5-3 is a map of groundwater basins in the Water Authority service area with their designated SGMA priority levels.

Figure 5-3. San Diego Groundwater Basins SGMA Priority Map



- | | | |
|------------------------------|------------------------|--------------------------------|
| 1. SAN MATTEO VALLEY | 7. SAN MATTEO VALLEY | 14. POWAY VALLEY |
| 2. SAN ONOFRE VALLEY | 8. SAN PASQUAL VALLEY | 15. SANTA MARIA VALLEY |
| 3. SANTA MARGARITA VALLEY | 9. ESCONDIDO VALLEY | 16. SAN DIEGO RIVER VALLEY |
| 4. LOWER SAN LUIS REY VALLEY | 10. SAN MARCOS AREA | 17. EL CAJON VALLEY |
| 5. UPPER SAN LUIS REY VALLEY | 11. BATIQUITOS LAGOON | 18. MISSION VALLEY |
| 6. WARNER VALLEY | 12. SAN ELIJO VALLEY | 19. COASTAL PLAIN OF SAN DIEGO |
| | 13. SAN DIEGUITO CREEK | |

5.3.4 Projected Groundwater Supply Yield

The Water Authority has worked closely with its member agencies to develop groundwater yield projections. The most reliable projections have been developed by considering only existing (i.e., verifiable) groundwater projects, which include planned expansions to existing projects.

Table 5-3 shows the projected annual yield from verifiable groundwater projects in five-year increments, based on projections and implementation schedules or existing projects and planned expansions provided by the member agencies. These are included in the reliability analysis found in *Section 9 Water Supply Reliability*. Table F-2 in Appendix F lists the projects and their projected supplies.

Table 5-3. Projected Groundwater Supply (Normal Year, AFY)

2020	2025	2030	2035	2040	2045
25,950	30,300	31,500	31,500	28,800	28,000

An overall projected increase in groundwater production from 2020 and beyond is due primarily from increased production from MCB Camp Pendleton's groundwater production wells in the Lower Santa Margarita, Las Flores, San Mateo and San Onofre Basins.

Additional Planned Projects—Groundwater

Maximizing groundwater development is critical to diversifying the region's water supply portfolio. Beyond the projections of the more reliable and verifiable projects included in Table 5-3, member agencies have also identified two additional planned projects, with an estimated total of 1,620 AFY of additional yield in 2045. The Otay Water District Rancho Del Rey Groundwater Well Development Project is expected to yield 500 AFY by 2035. The San Dieguito River Basin Brackish Groundwater Recovery and Treatment led by Olivenhain Municipal Water District anticipates groundwater production of 1,120 AFY by 2025.

These additional yields are considered additional planned supplies and are reflected in *Section 10 Scenario Planning—Managing an Uncertain Future*, as potential strategies to manage future uncertainty planning scenarios. These additional planned projects, as well as the conceptual projects provided by the member agencies, are also included in Appendix F in Table F-2.

5.4 Recycled Water Supply

Recycled water has been a growing water resource in San Diego County for decades providing a local, drought-resilient supply that reduces our region's dependence on imported water. Every gallon of recycled water used within the region reduces the need to import or develop other water supplies. Of the Water Authority's 24 member agencies, 17 have developed recycled water supplies for their retail customers. Member agencies are continuing to expand their recycled water treatment and distribution systems and it is predicted that member agencies

will produce approximately 46,800 AF annually by 2045. While the Water Authority does not produce recycled water, it supports the development of recycled water by providing member agency technical support and through regulatory and policy advocacy at the local, state and federal levels. Water Authority staff convene recycled water member agencies, on an as-needed basis, to foster data-sharing and partnerships to support recycled water development in the region.

This section provides an overview of recycled water development in the Water Authority's service area, potential fiscal and regulatory constraints to protect development, project funding opportunities, and projected regional yield. Documentation about specific existing and future recycling projects is expected to be part of the 2020 UWMPs for those agencies that include water recycling as a supply. The Water Authority coordinated preparing this section with its member agencies and those wastewater agencies operating water recycling facilities in the Water Authority's service area.

5.4.1 Recycled Water Description

Water may be recycled for non-potable or potable purposes. This section is about non-potable water recycling. Non-potable water recycling entails the treatment and disinfection of municipal wastewater to provide a water supply suitable for non-drinking uses. Non-potable water recycling in the San Diego region started in the 1960s when Padre Dam Municipal Water District began recycling water for use in Santee Lakes. Water recycling as a process started to increase significantly in the 1990s. Today, agencies in the County use recycled water to fill lakes, ponds, and ornamental fountains; to irrigate parks, campgrounds, golf courses, freeway medians, community greenbelts, school athletic fields, food crops, and nursery stock; and to control dust at construction sites. Recycled water can also be used in certain industrial processes, in cooling towers, and for flushing toilets and urinals in non-residential buildings. Recycled water is also used for street sweeping and firefighting purposes.

Local agencies must consider a number of issues when developing recycled water projects, including economic and financial considerations; regulatory, institutional, and public acceptance issues; and water quality concerns related to unknown or perceived health and environmental risks. These issues, if unresolved, can limit the amount of recycled water use in the County. The following sections discuss some of the specific challenges associated with recycled water development.

With additional water treatment, recycled water can also be treated to drinking (i.e., potable) water standards. Additional information about advanced water purification (or potable reuse) is found in *Section 5.5 Potable Reuse Supply*.

Economic and Financial Considerations

The capital-intensive cost of constructing recycled water infrastructure and managing a dual distribution system has traditionally been a barrier to project implementation. The upfront

capital costs for construction of treatment facilities and recycled water distribution systems can be high while full market implementation is usually phased over a number of years, resulting in very high initial unit costs that affect cash flow in the early project years. Some local agencies have been successful in expanding recycled water by requiring developers to install dual-plumbed systems as new development infrastructure is built. Otay Water District, Carlsbad Municipal Water District, and the City of San Diego have all been successful using this approach.

The high costs associated with converting existing water customers to non-potable recycled water use have also been challenging. This situation is compounded by the seasonal nature of recycled water demands, a lack of seasonal storage and the lack of large industrial water users in San Diego County that can use recycled water. Projects that serve a large portion of irrigation demands, which are the majority of the projects in the Water Authority's service area, often use only half of their annual production capacity due to these seasonal demand patterns. The unit costs associated with these projects are generally higher than those of projects that serve year-round demands, since the project facilities must be sized to accommodate seasonal peaking. Projects that serve mostly irrigation demands also tend to have less stable revenue bases because irrigation demands are heavily influenced by hydrologic conditions.

Recycled water is typically stored in storage tanks and ponds. Availability of seasonal and operational storage can help ensure a continuous demand and production of recycled water throughout the year, thus making projects more cost-effective. To be economically feasible, a project's benefits must offset or exceed its associated costs. Project benefits can take the form of:

- Revenues from the sale of recycled water
- Increased supply reliability
- Increased control over the cost of future water supplies
- Avoided water and wastewater treatment, storage, and conveyance costs

Agencies developing recycled water projects must be able to quantify these benefits to determine the economic feasibility of a project. In addition, financial incentives and grant funding from local, federal and state agencies are critical to offsetting project costs and project implementation.

Regulatory

Two state agencies have primary responsibility for regulating the application and use of recycled water: the SWRCB under its Division of Drinking Water (DDW) and the California Regional Water Quality Control Boards (Water Boards). The administration of the Drinking Water Program was transferred from the California Department of Public Health (CDPH) to the SWRCB on July 1, 2014. DDW was formed as part of that reorganization. This transfer of responsibility aligned the State's drinking water and water quality programs in an integrated organizational structure that positioned the State to both protect water quality and the public

health as related to water quality, while meeting current needs and future demands on water supplies. Planning and implementing water recycling projects entail numerous interactions with these regulatory agencies prior to project approval.

DDW is responsible for establishing statewide criteria for recycled water uses in Title 22 of the California Administrative Code. Under Title 22, the standards are established for each general type of use based on the potential for human contact with recycled water. The highest degree of standards for recycled water is for unrestricted body contact.

The San Diego RWQCB, one of nine California Water Boards, is charged with issuing permits and enforcing requirements for the application and use of recycled water, which ensures compliance with the objectives of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan; San Diego RWQCB, 1994) and incorporates recommendations from DDW. As part of the permit application process, applicants must demonstrate that the proposed recycled water operation will meet the ground and surface water quality objectives in the Basin Plan and will comply with Title 22 requirements. With the consent of the recycled water supplier, the San Diego RWQCB and DDW may delegate review of individual non-potable use sites to the County of San Diego Department of Environmental Health (DEH). Under a delegation agreement with the State Department of Public Health, the DEH regulates the use of recycled water to prevent potential health risks from direct contact with recycled water and cross-connections of recycled water and drinking water supplies.

Coordination between the regulatory agencies responsible for monitoring development of recycled water is important, along with the development of a reasonable and consistent application of regulations. Project proponents need to work closely and cooperatively with regulatory agencies in their efforts to satisfy the regulations and still be able to develop much needed, cost-effective water recycling projects. The Water Authority participates in regulatory advocacy on behalf of recycled water member agencies through direct participation at the state, local, and federal level, and in partnership with industry associations such as the WaterReuse Association and the Association of California Water Agencies. Water Authority staff work closely with member agencies on proposed recycled water policy and regulations to ensure that the region's recycled water priorities are considered in the development of recycled water policy and regulations.

The *Policy for Water Quality Control for Recycled Water* (Recycled Water Policy; SWRCB, 2018) is an important statewide policy first adopted by the SWRCB in 2009 to encourage the safe use of recycled water while protecting public health and the environment. The Recycled Water Policy was updated by the SWRCB in 2013 and in 2018. Water Authority staff advocated throughout the SWRCB's public process for reasonable regulations that support local projects while protecting public health and the environment. Staff worked closely with member agencies to analyze proposed changes to the Recycled Water Policy, and met with SWRCB staff, developed comment letters, provided public testimony to the SWRCB on behalf of the San Diego region. The Recycled Water Policy includes the following elements:

- A goal of increasing statewide water recycling
- Requirements for salt and nutrient management plans for groundwater basins
- Requirements for annual reporting to the SWRCB on wastewater produced and discharged and recycled water used
- Requirements for monitoring chemicals of emerging concern in recycled water, including water for potable reuse

Institutional

The primary institutional issue related to the development of water recycling in the County is interagency coordination, such as when the wastewater agency that produces recycled water is not the purveyor of that water purveyor in the reuse area. Providing service to the water customer is vital; at those times, effective communication and cooperation should take place early in the process between both agencies regarding distribution of recycled water.

Institutional arrangements for distribution of recycled water require contracts or agreements among the parties or agencies involved, the terms of which must be established on a case-by-case basis. These agreements usually define the reporting and compliance responsibilities, the amount of recycled water deliveries, water pricing, and a financing plan that identifies which agency will receive financial incentives. Many local entities in the San Diego region have responsibilities to provide both water and wastewater services. In locations where water and wastewater agencies are not the same purveyor, close collaboration takes place for planning, permitting and operating recycled water facilities. These close relationships have helped to advance recycled water use in the San Diego region.

Public Acceptance

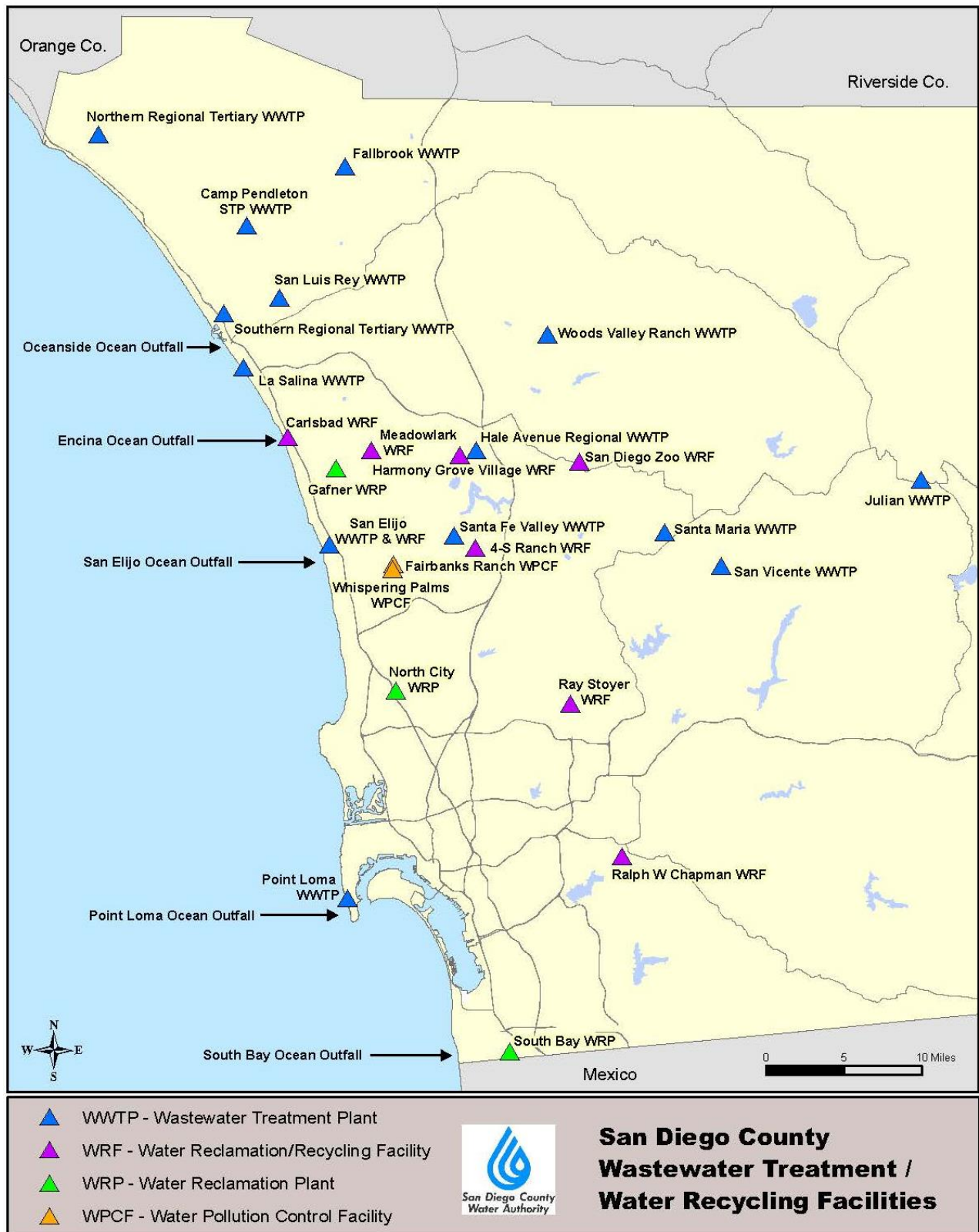
Public acceptance is critical to successful siting, financing, constructing, and operating a water recycling project. Concerns from the public about general water quality and safety are often due to a lack of understanding regarding the water recycling treatment process. The most successful means to obtaining public acceptance is through education and involvement.

The Water Authority regularly engages residents about recycled water through community outreach, social media and other forms of communication, and conducts periodic surveys and focus groups to receive feedback. Recent focus groups indicate that the public is now more accepting of the safety and beneficial use of recycled water for non-potable uses, particularly during drought events. The Water Authority's *Water Issues Survey* (2019) showed that expanding recycled water for agriculture and irrigation is the most supported water reliability project, followed by recycling water and purifying it to drinking water standards using advanced water treatment technologies.

5.4.2 Wastewater Generation, Collection, Treatment, and Disposal

Multiple Water Authority member agencies provide wastewater services wastewater collection, treatment and disposal. Approximately 225 MGD of wastewater is currently generated, collected, treated, and disposed of within the Water Authority's service area and provides significant potential for recycled water use. Most of the large wastewater treatment plants are located along the coast for easy and convenient access to an ocean outfall. These plants serve most of the San Diego region's highly urbanized areas. Figure 5-4 shows the location of wastewater treatment plants in San Diego County (both within and outside of the Water Authority's service area), and the associated outfall systems. The coastal location of the plants is not always conducive to development of recycled water. Most of the market for recycled water is located at higher elevations, making distribution systems costly. However, recycled water costs can be offset by possible savings on wastewater treatment costs where those savings are available. Table F-3, Appendix F shows a detailed list of the wastewater treatment plants within the county, their capacities at various levels of treatment, and the type of disposal. In unincorporated communities of San Diego County outside of the Water Authority service area, wastewater districts provide sewage treatment and disposal through percolation of effluent into the soil and/or reuse through irrigation of vegetation or agricultural crops.

Figure 5-4. Wastewater Treatment and Water Recycling Facilities



5.4.3 Encouraging Recycled Water Development

The UWMP Act requires agencies to describe the actions, including financial incentives, that agencies may take to encourage the use of recycled water in their UWMPs.

Local Water Supply Development Program

The Water Authority administers the Local Water Supply Development Program (formerly the Recycled Water Development Fund Program, adopted by the Board in April 1991), which is designed to ensure the financial feasibility of local water recycling projects during their initial years of operation and to incentivize recycled water development in the Water Authority service area. To date, the Water Authority has entered into Local Water Supply Development Program agreements with 12 water and wastewater agencies for a combined project yield of over 46,000 AFY. Over \$55 million in Water Authority incentive funding has been awarded to program participants. In fiscal year 2020, the Water Authority provided local agencies with \$3 million in Local Water Supply Development Program incentives for agencies with existing executed agreements for recycled water projects.

Funding Programs

An important component of a successful recycling project is securing diversified funding and establishing funding partnerships. Table 5-4 summarizes existing funding programs used by the Water Authority's member agencies. While some of the programs have been developed by water agencies, others are funded and implemented by local, state or federal agencies.

Table 5-4. Programs or Efforts to Encourage Recycled Water Use

Incentive Programs
<ul style="list-style-type: none"> Local Water Supply Development (Water Authority) Local Resources Program (Metropolitan) On-Site Retrofit Program (Metropolitan)
Grants
<ul style="list-style-type: none"> Title XVI Funding Program (U.S. Bureau of Reclamation) Proposition 50 the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (California Department of Water Resources) Proposition 84 Planning Grants and Implementation (California Department of Water Resources) Proposition 1 (California Department of Water Resources) Proposition 68 (State Water Resources Control Board) Water Infrastructure Improvements for the Nation (WIIN) Act (U.S. Bureau of Reclamation)
Low-Interest Loans
<ul style="list-style-type: none"> Clean Water State Revolving Fund Program (State of California) Water Infrastructure Finance and Innovation Act (WIFIA) (U.S. Environmental Protection Agency)
Regional Planning and Regulatory Assistance
<ul style="list-style-type: none"> Regional coordination with member agencies and regulatory agencies on recycled water issues Initiate, review and comment on regulatory developments and legislation to support local projects Lead regional planning and grant funding through San Diego IRWM Program

The Water Authority has focused on providing and facilitating acquisition of outside funding for water recycling projects. Financial assistance programs used by County agencies include the following:

- Metropolitan's Local Resources Program
- Reclamation's Title XVI Grant Program
- SWRCB low-interest loan programs
- IRWM Grant Program

Together, these programs offer funding assistance for all project phases, from initial planning and design, to construction and operation. Financial assistance programs administered by the Water Authority and Metropolitan provided \$8.3 million to County agencies during fiscal year 2019.

Metropolitan's Local Resources Program

The Local Resources Program (LRP), administered by Metropolitan, provides funding for the development of water recycling, groundwater recovery, and seawater desalination supplies that replace an existing demand or prevent a new demand on Metropolitan's imported water deliveries. There are currently twelve active LRP Agreements between Water Authority member agencies and Metropolitan for recycled water projects.

Reclamation's Title XVI Grant Program

Since 1995, the Title XVI Grant Program has been a significant source of funding for San Diego region's water recycling projects. Projects funded by Title XVI provide communities with new and local sources of water that increase water management flexibility and reduce dependence on imported water. Title XVI of Public Law 102-575, the Reclamation Wastewater and Groundwater Study and Facilities Act, authorized the federal government to fund up to 25% of the capital cost of authorized recycling projects, including the San Diego Area Water Reclamation Program, an inter-connected system of recycling projects serving the Metropolitan Sewage System service area. Public Law 104-266, the Reclamation Recycling and Water Conservation Act of 1996, authorized two additional projects in northern San Diego County: the North San Diego County Area Water Recycling Project and the Mission Basin Brackish Groundwater Desalting Demonstration Project. The North San Diego County project received its final federal funding in 2008 when it reached its maximum federal funding limit of \$20 million. The City of Oceanside's Mission Basin Brackish Groundwater Desalting Demonstration Project was also completed and received final funding totaling \$3,484,000. To date, San Diego region agencies have received more than \$113 million under the Title XVI grant program.

The funding mechanism for the San Diego region projects (and all other authorized Title XVI projects) was changed from direct appropriations to a competitive process that requires applications to be submitted in response to an annual Funding Opportunity Announcement.

Table 5-5 lists recycled water projects in the San Diego region that were authorized for Title XVI funding.

Table 5-5. Authorized Title XVI Project Funding—San Diego Region

Fiscal Year Authorization	Applicant, Project Description or Program	Funding
2016	City of San Diego San Diego Area Water Reclamation Program Pure Water San Diego Program	\$5,000,000
	Padre Dam Municipal Water District San Diego Area Water Reclamation Program Padre Dam Water Recycling Facilities – Phase I Expansion	\$4,500,000
	Sweetwater Authority San Diego Area Water Reclamation Program Sweetwater Authority Water Reclamation Project	\$3,700,000
2017	City of San Diego San Diego Area Water Reclamation Program Pure Water San Diego Program	\$4,200,000
	Padre Dam Municipal Water District San Diego Area Water Reclamation Program Padre Dam Water Recycling Facilities—Phase I Expansion	\$3,900,000
2018	City of San Diego San Diego Area Water Reclamation Program Pure Water San Diego Program	\$9,000,000
	Padre Dam Municipal Water District San Diego Area Water Reclamation Program East County Advanced Water Purification Program	\$7,392,351
	City of Escondido San Diego Area Water Reclamation Program Membrane Filtration Reverse Osmosis Facility Project	\$5,000,000
2019	City of Escondido Membrane Filtration Reverse Osmosis Facility	\$3,069,303
	City of San Diego Pure Water San Diego Program	\$1,160,139
	Padre Dam Municipal Water District East County Advanced Water Purification Program	\$4,000,000

SWRCB Low-interest Loan Program

The SWRCB, through its Division of Financial Assistance, offers low-interest financing agreements for water quality projects and water reclamation facilities. For fiscal years 2018 and 2019, the SWRCB made 153 binding commitments totaling over \$1.5 billion in low-cost financing to eligible projects (SWRCB, 2020). The Clean Water State Revolving Fund offers agencies a below-market interest rate that can result in substantial savings on debt service. Approximately \$114 million was allotted to the SWRCB in fiscal year 2019 for funding water recycling projects (SWRCB, 2020). Padre Dam MWD was awarded a \$101.2 million funding

commitment from the Clean Water State Revolving Fund, a SWRCB managed low-interest loan program. The loan amount will support the expansion of Padre Dam Municipal Water District's water reclamation facility, advanced water treatment, and brine line connection. Additional construction funding can be obtained through the Water Recycling Funding Program, which provides grants up to 35% of eligible construction costs incurred, including construction allowances.

Integrated Regional Water Management (IRWM) Grant Funding— Propositions 50,84 and 1

In 2007, the San Diego IRWM Program submitted a grant proposal to DWR for Proposition 50 grant funds and was awarded \$25 million in grant funding. *Section 8 Integrated Regional Water Management Planning* describes the IRWM Program in more detail. Operation of the Recycled Water Retrofit Assistance Program, managed and administered by Water Authority staff on behalf of its member agencies, continues to provide Proposition 50 grant funding to the Water Authority's member agencies and their customers. Project grant funding facilitated the retrofitting of user sites to receive recycled water and provided direct funding to water and wastewater agencies to make the required alterations and distribution system expansions to bring recycled water to their respective customer bases.

In 2011, the San Diego IRWM Program was awarded \$7.9 million in Proposition 84 Round 1 grant funds. One of the projects funded through this source was Phase I of the North San Diego County Regional Recycled Water Project. This project is an effort by North San Diego County water and wastewater agencies to regionalize recycled water systems by identifying new agency interconnections, seasonal storage opportunities, and indirect potable water use that would maximize supplies, reduce wastewater discharges to the ocean, reduce energy consumption due to diminished delivery of imported water, and allow recycled water to play an even more significant role in meeting the region's future water needs. This project involved the support of many partners, including the Olivenhain Municipal Water District, Carlsbad Municipal Water District, Vallecitos Water District, Santa Fe Irrigation District, City of Oceanside, Vista Irrigation District, Leucadia Water District, City of Vista/Buena Sanitation District, San Elijo Joint Powers Authority, City of Escondido, and Rincon del Diablo Municipal Water District.

In 2014, the San Diego IRWM Program was awarded approximately \$10.5 million in grant funds made available through Proposition 84 Round 2. One of the selected projects helped to implement the 10 priority sub-projects identified in Phase I of the North San Diego County Regional Recycled Water Project. Phase II of the North San Diego County Regional Recycled Water Project helped to increase connectivity between recycled water facilities in north San Diego County. This effort increased the use of recycled water by allowing it to be distributed across the North County region and produced an estimated 6,790 AFY of recycled water. Project benefits included reducing imported water dependency, reducing discharge of recycled water to the ocean, reducing energy consumption from pumping imported water, and

providing more recycled water for future water needs. The agencies involved with this effort were the Leucadia Wastewater District, Vallecitos Water District, Vista Irrigation District, Rincon del Diablo Municipal Water District, Olivenhain Municipal Water District, Santa Fe Irrigation District, Carlsbad Municipal Water District, the City of Escondido, the City of Oceanside, and the San Elijo Joint Powers Authority.

In 2015, the San Diego region received \$15 million to implement seven priority, drought-related projects by public agencies in the San Diego IRWM region. The funding was made available through the DWR's Proposition 84 Drought Round (Round 3). In this round, two recycled water projects were funded: the Fallbrook Plant Nurseries Recycled Water Distribution System Expansion Project and Carlsbad Recycled Water Plant and Distribution System Expansion Project. Fallbrook's project aimed to deliver 642 AF of additional recycled water to users while Carlsbad's project increased treatment capacity at the Carlsbad Water Recycled Facility from 4 to 6 MGD.

In 2016, the San Diego region was awarded \$31.1 million in grant money for the final round of Proposition 84 for a variety of projects in the region that aimed to increase local water supplies, decrease water demands, improve water quality, manage stormwater, restore habitat and enhance species. A total of 13 geographically representative projects were selected; two of them were recycled water projects. The Escondido Advanced Water Treatment for Agriculture project, in the North County region, will construct a new microfiltration and reverse osmosis advanced treatment facility to produce advanced treated water, which will then be blended with water from an existing recycled water plant for agricultural use. Also funded through this round of IRWM funding was the Padre Dam Advanced Water Treatment, Phase I Expansion which received a total of \$6 million for the expansion of the Ray Stoyer Water Reclamation Facility by 4 MGD.

In 2020, the San Diego IRWM Program was awarded \$15.3 million for Proposition Round 1 for a total of eight regional projects. Two of the eight projects have the primary benefit of providing water supply through non-potable water recycling, the North County Recycled Water Project and the San Elijo Stormwater Capture and Reuse Project. The North County Recycled Water Project will produce 265 AFY and allow four member agencies to expand their recycled water deliveries.

In total, the San Diego region has received more than \$111 million in IRWM funding, which has supported 74 priority projects and development of the 2019 IRWM Plan update. Below, Table 5-6 lists the recycled water projects that have received grant funds through the San Diego IRWM Program.

Table 5-6. Recycled Water Grant Sources

Funding Proposition	Project	Lead Agency	Grant Award
Proposition 50	Ray Stoyer Water Recycling Facility Demonstration Plant for Advanced Water Treatment	Padre Dam Municipal Water District	\$3,000,000
	Recycled Water Retrofit Assistance Program	Water Authority	\$800,000
	Recycled Water Distribution System Expansion	City of San Diego	\$4,765,146
Proposition 84 Round 1	North San Diego County Regional Recycled Water Project	Olivenhain Municipal Water District	\$1,455,000
	North San Diego County Demineralization Project	San Elijo Joint Powers Authority	\$1,018,500
Proposition 84 Round 2	North San Diego County Regional Recycled Water Project Phase II	Olivenhain Municipal Water District	\$3,452,000
	Failsafe Potable Reuse at the Advanced Water Purification Facility	WaterReuse Research Foundation	\$2,113,000
	Rural Disadvantaged Community Partnership, Phase II	Rural Community Assistance Corporation	\$350,300
Proposition 84 Drought Round	Fallbrook Plant Nurseries Recycled Water System Expansion	Fallbrook Public Utility District	\$772,000
	Carlsbad Recycled Water Plant and Distribution System	Carlsbad Municipal Water District	\$4,000,000
Proposition 84 Final Round	Padre Dam Advanced Water Treatment Phase I Expansion	Padre Dam Municipal Water District	\$6,000,000 \$2,900,000
	Safari Park Drought Response and Outreach	Zoological Society of San Diego	\$2,500,000
	Integrated Water Resource Solutions for the Carlsbad Watershed	San Elijo Joint Powers Authority	\$2,000,000
	Escondido Advanced Water Treatment for Agriculture	City of Escondido	\$2,000,000
	UC San Diego Water Conservation and Watershed Protection Project	University of California, San Diego	\$1,435,000
	Rural Disadvantaged Community Partnership, Phase III	Rural Community Assistance Corporation	\$462,654
Proposition 1 Disadvantaged Community Involvement Grant	Alternative Non-Potable Water Supplies, Xeriscape Design	University of California, San Diego	\$1,987,954
Proposition 1 Round 1	North County Recycled Water Project	San Elijo Joint Powers Authority	\$2,820,000
	San Elijo Stormwater Capture and Reuse	San Elijo Joint Powers Authority	\$1,195,000
Total			\$39,011,554

Optimizing the Use of Recycled Water—Regional Coordination

In addition to disseminating funding opportunities and providing technical assistance to apply for funding, Water Authority staff also provide regional coordination on planning and regulatory issues to help reduce costs associated with development of recycled water. In support of the SWRCB call for salinity and nutrient management planning, the Water Authority, in cooperation with the Southern California Salinity Coalition (SCSC), worked in partnership with the San Diego RWQCB staff to develop *Guidelines for Salinity/Nutrient Management Planning in the San Diego Region* (Water Authority et al, 2010). The Recycled Water Policy encouraged a stakeholder-driven process for the development of salt and nutrient management plans (SNMPs) on a basin-wide basis, as opposed to an individual discharge permit level. The San Diego region was unique in that the planning process encompassed 17 fairly small groundwater basins with varying levels of use and variable water quality. Consistent with the Recycled Water Policy, the Southern California Salinity Coalition and the Water Authority worked with local stakeholders and San Diego RWQCB staff to develop a standardized framework and approach for development of salt and nutrient management plans in the region. The *Guidelines for Salinity/Nutrient Management Planning* were endorsed by the San Diego RWQCB in November 2010.

The *Guidelines for Salinity/Nutrient Management Planning* establish priorities based on each basin's characteristics and importance within the region. The guidelines provide technical approaches and strategies for managing salt and nutrients. Guidelines provide regulatory certainty for stakeholders, and helped to expedite the development of the first SNMPs in the region. IRWM grant funding was secured in 2011 with support from the San Diego RWQCB to help fund the development of the first five SNMPs in the San Diego region through Proposition 84 grant funding. A total of eight SNMPs have been or are in the process of being developed in the San Diego region. Implementation of the SNMPs will improve overall water quality and use of groundwater resources in the San Diego region.

The *Guidelines for Salinity/Nutrient Management Planning* were highlighted as an example of a regional basin prioritization system during the SWRCB's 2018 amendment to the Recycled Water Policy. The amendment supports region-specific basin evaluations to provide a more accurate water quality assessment compared to relying on statewide systems. The policy also acknowledges that the most effective salt and nutrient management is likely to be achieved through local SNMPs rather than imposing requirements solely on individual projects or sources of salts and nutrients. The Recycled Water Policy requires each Water Board to evaluate basins in its region before April 8, 2021 and identify where salts and nutrients are a threat to water quality and need salt and nutrient management planning.

California WaterReuse Action Plan

The *California WaterReuse Action Plan* (WaterReuse, 2019) provides a clear and concise strategy to advance water reuse in California over 30 years. It was released in July 2019 by WaterReuse

California in collaboration with Water Authority staff and water agency representatives across California. The plan identifies four strategic areas for action: research, regulations, regional planning, and funding. These actions and 20 specific recommendations will more than double the use of water recycling in California and prepare the state for the impacts of climate change.

Increasing water recycling is a key component of Governor Newsom's comprehensive *2020 Water Resilience Portfolio* (California Natural Resources Agency et al., 2020) to address the state's water challenges. The *Water Resilience Portfolio* features many recommendations contained in the *California WaterReuse Action Plan*.

National Water Reuse Action Plan

The *National Water Reuse Action Plan* (WRAP; USEPA, 2020) is a plan to advance water reuse across the nation in a coordinated and collaborative effort to ensure water security, sustainability, and resilience. The USEPA and its federal partners released the WRAP in February 2020 following a public process that engaged other federal, state, and local water leaders. The WaterReuse Association also led a coalition of partner water associations including the Water Authority to provide input into the plan. The WRAP identifies 10 strategic objectives and 46 actions to be implemented by federal, state, local and private sector partners. Water Authority staff is participating in implementation of the WRAP through WaterReuse and participation in federal workgroups.

5.4.4 Projected Recycled Water Use

The Water Authority worked closely with its member agencies to determine the projected yield from existing and planned recycled water projects. Table 5-7 shows the estimated annual yield from the projects in five-year increments based on the implementation schedules provided by the member agencies and the likelihood of development. These projected supply yields will be included in the reliability analysis found in *Section 9 Water Supply Reliability*. Table F-4 in Appendix F contains a detailed list of these projects and projected supplies.

Table 5-7. Projected Recycled Water Use (Normal Year, AFY)

2020	2025	2030	2035	2040	2045
37,372	42,993	46,493	46,593	46,693	46,793

As shown in Table 5-7 above, the projected normal year yield for 2020 is 37,372 AFY. The increase in projected recycled water use shown in Table 5-7 in 2025 and beyond is primarily from the expansion of existing facilities. For example, the City of Oceanside is in the process of expanding their current recycled water system via the Upper and Lower Recycled Water System Expansion Project. These expansions entail constructing the upper conveyance system in the northeastern portion of the city and the lower conveyance system in the southeastern region of the system. The upper conveyance system will construct approximately 60,700 feet of recycled water pipeline, a 3-million gallon storage reservoir, and a pump station. The lower system will construct 28,500 linear feet of recycled water pipeline, a 2.2-million gallon reservoir, a pump

station and connections to existing recycled water pipeline. The Upper and Lower Recycled Water System Expansion Project will provide up to 2,640 AFY to agricultural, landscape and urban irrigation customers. The first year of operation is scheduled for 2021.

Additionally, the City of Escondido's Advanced Water Treatment for Agriculture project, funded under Proposition 84, will construct a new microfiltration/reverse osmosis advanced treatment facility with a total production capacity of 3,280 AFY upon completion in 2021. Water treated at the microfiltration/reverse osmosis facility will be blended with tertiary treated water from an existing recycled water plant and distributed to agricultural customers in the northern and eastern areas of Escondido. The City of Escondido has partnered with Escondido Growers for Agricultural Preservation, the City of San Diego, and Rincon del Diablo Municipal Water District to implement this project. This project supports the San Diego region's goals of supply reliability and sustainability and protects water quality while supporting local agriculture and the economy.

Additional Planned Projects—Recycled Water

Maximizing recycled water development is critical to diversifying the region's water supply portfolio. Beyond the verifiable project yields included in Table 5-7 above, member agencies have also identified additional planned projects. Carlsbad Municipal Water District, MCB Camp Pendleton, and Olivenhain Municipal Water District have identified additional planned projects that are projected to yield an additional 4,765 AFY by 2025. These yields are considered additional planned supplies and are used in *Section 10 Scenario Planning—Managing an Uncertain Future*. These additional planned projects, as well as the conceptual projects provided by the member agencies, are also included in Table F-4 in Appendix F.

5.5 Potable Reuse Supply

Numerous drivers make potable reuse an attractive option for the San Diego region and throughout California. Climate change is creating unpredictable weather patterns, which may result in recurring droughts and cause scarcity of water supply. Potable reuse is a renewable resource that is drought resilient and locally controlled. Maximizing the use of recycled water can also reduce impacts and costs associated with discharging wastewater to the ocean. Potable reuse can provide a cost-effective, sustainable, and high-quality drinking water supply for the region.

5.5.1 Potable Reuse Background and Description

Recycled water can be further treated for potable reuse through the use of multi-barrier advanced purification treatment processes, which may include technologies such as reverse osmosis and advanced oxidation. Potable reuse is considered indirect when a groundwater basin or surface water reservoir is incorporated to provide additional treatment for potable purposes. Recycled water may be percolated into the groundwater, or highly treated water can be directly injected into the groundwater basin. Recycled water may also be added to a raw

water reservoir used as drinking water supply in which it blends with imported water or other local supply. Projects that deliver advanced treated water directly to a raw or treated water pipeline are considered direct potable reuse. In raw water augmentation, recycled water is added to a raw water supply immediately upstream of a water treatment plant. In treated drinking water augmentation, recycled water is placed directly into the water distribution system.

Several Water Authority member agencies are planning potable reuse projects in San Diego County. As part of these efforts, agencies have participated in research studies, implemented pilot projects to determine project viability, and conducted extensive public outreach programs. The City of San Diego and Padre Dam MWD are pursuing reservoir augmentation projects, also referred to as surface water augmentation. The City of Oceanside is constructing a groundwater augmentation project, which will be the first potable reuse project in San Diego County. In addition, a large coalition of member agencies in North County are evaluating indirect and direct potable reuse as part of a plan to optimize water recycling efforts. Detailed member agency project information can be found in *Section 5.5.3 Project Supply through Potable Reuse*.

De facto or incidental reuse has taken place for many years as wastes are discharged to rivers and collected and treated for potable water supplies downstream. Clean Water Act standards placed on waste discharges and treatment requirements for water suppliers through the Safe Drinking Water Act have been designed to avoid waterborne disease outbreaks and to ensure a safe and reliable potable water supply for customers. These requirements protect the public from waterborne disease outbreaks and health impacts from chemical constituents and emerging compounds. The longest standing groundwater recharge project in California has been in existence since 1962.

Locally, potable reuse was first considered in the early and mid-1990s. The Water Authority and the City of San Diego proposed a potable reuse project that would deliver advanced treated water from the North City Water Reclamation Plant and convey it to San Vicente Reservoir where it would be blended with imported and local surface water prior to being treated at a surface water treatment plant. The Water Authority created a citizens advisory group to advise the Water Authority on the suitability of potable reuse as a water supply for San Diego County. In 1994, the Repurified Water Review Committee recommended pursuit of potable reuse part of a diversified mix of water supplies. The Water Authority sponsored the work of an Independent Advisory Panel of experts for indirect potable reuse and, along with the City of San Diego, conducted detailed studies that were submitted to state health authorities to determine regulatory guidelines for an indirect potable reuse project blending advanced treated recycled water in San Vicente Reservoir. The Drinking Water Program at California Department of Public Health, now the DDW under the SWRCB, approved this concept of reservoir augmentation in 1996. In 1998, the Water Authority co-funded a report by the National Research Council titled *Issues in Potable Reuse: The Viability of Augmenting Drinking Water Supplies with Reclaimed*

Water (National Research Council, 1998), which concluded that planned indirect potable reuse was a viable water supply option.

In 2006, the City of San Diego again began planning for a potable reuse project and, in 2012, DDW and the San Diego RWQCB conceptually approved the City of San Diego's proposed indirect potable reuse project for surface water augmentation. In May 2020, the San Diego RWQCB adopted a National Pollutant Discharge Elimination System (NPDES) permit to allow the City of San Diego to add purified water to the Miramar Reservoir for the Pure Water San Diego Program. This is the first NPDES permit approved for a reservoir augmentation project in California.

Although there aren't yet any DPR projects approved yet in California, there has been significant progress in California and across the nation. The first permanent DPR project in the nation began operation in Texas in response to extreme drought conditions. Since that time, there has been many years of advanced research concerning potable reuse in California and elsewhere that demonstrates reliable technology is available for agencies to safely implement DPR as a potentially viable treatment option.

DDW has the authority to permit direct potable reuse projects and is moving forward with developing uniform criteria (regulations). Uniform DPR regulations will permit water suppliers in San Diego to maximize the use of existing infrastructure and produce a new, safe, and viable potable water supply for the San Diego region. As water supplies become increasingly scarce, particularly in the arid west, more potable reuse such projects are likely to be proposed.

Economic and Financial Considerations

Potable reuse projects are being considered when they are deemed cost-effective and feasible compared with non-potable recycled water projects. Potable reuse projects have an advantage as they do not require construction of a dual distribution system, and once treatment and conveyance facilities have been constructed, the full amount of water produced can be immediately available to augment local water supplies. Costs for potable reuse are in range with other locally developed supplies. An added cost advantage may result as a potable reuse project may also contribute to meeting waste discharge requirements. Cost of conveyance to move advanced treated water to a local reservoir can be a significant component of a project cost. Advanced treated water delivered to a reservoir closer to the point of production can significantly reduce project costs. Regulatory requirements can have a significant impact on overall project costs.

Institutional

The institutional arrangements between wastewater agencies and water suppliers for potable reuse projects in the region are similar to those for recycled water, as described in *Section 5.4.1 Recycled Water Description*.

However, there are additional factors to consider with potable reuse related to treatment technologies, regulatory requirements, and increased coordination needed between operators of advanced treatment facilities and local surface water treatment facilities for projects with a downstream surface water treatment plant. The importance of operator certification was identified by water supply agencies and by the SWRCB's expert panel on direct potable reuse in their 2016 report. In response to this need, the California-Nevada Section of the American Water Works Association (CA-NV AWWA) and the California Water Environment Association (CWEA) jointly developed an advanced water treatment operator certification program. After four years of development with input from diverse stakeholders and experts, the certification program launched in July 2020. Support for the program including funding was provided by the Water Authority, WaterReuse California, and other water utilities throughout California. The certification program for advanced water treatment operators will support the increased knowledge and coordination required to ensure a safe reliable drinking water supply.

Public Acceptance

Like recycled water, public acceptance for potable reuse projects is critical for the success of the project. Potable reuse projects are under a high level of public scrutiny to ensure the safety of the drinking water supply. While the technology for potable reuse projects has been proven, these projects must garner public acceptance. In the San Diego region, project proponents have done a significant level of public outreach for potable reuse projects. Tours of demonstration facilities, such as those constructed by the City of San Diego and Padre Dam Municipal Water District, have proven highly successful in educating the public on the safety of the product water. Agencies have further developed informational videos, conducted in-person tours, and have made virtual tours of their projects available at any time to the public. Polls in the San Diego region have demonstrated increasing public acceptance of potable reuse as a safe water supply.

The Water Authority has worked with the member agencies through the Potable Reuse Coordination Committee to develop common language and messaging throughout the region. This ad hoc committee, consisting of regional agencies interested in developing and promoting potable reuse projects, meets on an as needed basis to engage and keep the member agencies informed on the latest potable reuse regulatory, legislative, and stakeholder outreach efforts at the local and state levels. In addition, the Water Authority participates on the WaterReuse California Communications Collaborative Group formed in October 2018 to provide a forum to discuss and collaborate on potable water reuse communications. In October 2019, the group released an Updated Terminology Document approved by WaterReuse California and ACWA. It provides outreach professionals with a framework to discuss water reuse with the public and a glossary of commonly encountered technical reuse terms.

Legislative and Regulatory

Legislative Requirements to Develop Potable Reuse Regulations

Potable reuse projects undergo a high level of regulatory oversight. Historically, projects were approved on a case-by-case basis, and an expert panel was convened to look at project specifics and provide recommendations to the project proponent and DDW. The California Legislature has passed several pieces of legislation to support development of potable reuse regulations in the state. SB 918 in 2010 and SB 322 in 2013, legislation sponsored and actively supported by the Water Authority, expedited the development of regulations for surface water augmentation. Specifically, the bills directed the state to:

- Adopt regulations for indirect potable reuse through groundwater recharge by December 31, 2013 (later moved to July 1, 2014).
- Form an expert panel to provide recommendations to DDW on the surface water augmentation regulations and feasibility of direct potable reuse.
- Form a public advisory group representing diverse water supply, environmental, and business interests to provide input to the expert panel on issues related to direct potable reuse, with all of the public advisory group meetings to be open and transparent public meetings.
- Adopt regulations for surface water (reservoir) augmentation by December 31, 2016.
- Report to the legislature by December 31, 2016 on the ability to adopt regulations for direct potable reuse.

The California Legislature also passed AB 574 in 2017. This legislation, co-sponsored by the WaterReuse California and California Coastkeeper Alliance, further expedited development of regulations for DPR, and required:

- Requires the SWRCB to adopt uniform water recycling criteria for direct potable reuse through raw water augmentation by December 31, 2023, with an option to extend by June 30, 2023 the deadline by up to 18 months.
- Requires the SWRCB to form an expert panel to review draft regulations.
- The SWRCB should establish a framework for the regulation of potable reuse projects by June 1, 2018.
- Defined direct potable reuse to include raw water augmentation, placement of recycled water into a raw water supply immediately upstream of a water treatment plant, and treated drinking water augmentation, placement of recycled water into the water distribution system.
- Redefined surface water augmentation to reservoir water augmentation to mean the planned placement of recycled water into a raw surface water reservoir used as drinking supply. Both terms are commonly used interchangeably.

Development of Potable Reuse Regulations

Summary timeline:

- June 2014 - CDPH adopted regulations for groundwater potable reuse projects
- December 2016 – SWRCB reported to the California Legislature that it is feasible to develop regulations for direct potable reuse
- March 2018 – SWRCB adopted surface water augmentation regulations
- April 2018 - SWRCB released its first draft of the Framework for Regulating Direct Potable Reuse in California
- December 2020 - SWRCB initiated the process to reconvene the DPR Expert Panel
- December 2023 – SWRCB is required to adopt regulations for DPR through raw water augmentation, with an option to extend up to 18 months

In June 2014, CDPH adopted regulatory criteria for approval of groundwater recharge projects. In March 2018, the SWRCB adopted surface water augmentation regulations. SB 322 was critical in helping move the evaluation of direct potable reuse forward in California.

Expert science panels and stakeholder advisory groups have provided important key support for the development of surface water augmentation and DPR regulations in California. In February 2014, CDPH formed the Public Advisory Group, which included the City of San Diego and Padre Dam MWD, as well as other San Diego interests. The Public Advisory Group provided recommendations to DDW on the formation of an expert panel to provide recommendations on technical issues related to surface water augmentation criteria and the feasibility of adopting regulations for potable reuse. The Public Advisory Group weighed in on developing common terminology to describe potable reuse and the need for having certified and qualified operators for advanced treatment facilities. The Advisory Group also expressed interest in economic impacts and viability of implementing potable reuse as well as public health concerns, including emerging contaminants

The Expert Panel convened in 2014 and was administered by the National Water Research Institute (NWRI). The panel was comprised of experts in the fields of toxicology, wastewater treatment, drinking water supplies treatment, drinking water standards, epidemiology, limnology, microbiology, and chemistry. The panel considered the proposed research agenda of the WaterReuse Research Foundation and provided recommendations to DDW regarding possible research gaps. DDW presented for consideration a proposed framework for surface water augmentation, the focus of which will be on multiple treatment barriers for removal of pathogens and chemical constituents and approaches for ensuring the reliable monitoring and operation of the treatment processes.

The Expert Panel completed its Final Report on *Investigation on the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse* (SWRCB, 2016) in August 2016. The panel provided recommendations related to public health issues and the scientific and technical matters regarding the feasibility of developing uniform water recycling criteria for DPR. As required by law, the SWRCB considered the recommendations of the Expert Panel and Advisory

Group in its report to the legislature. The Expert Panel found that it is technically feasible to develop uniform for DPR in California, with public health protection as good as or better than conventional drinking water supplies and indirect potable reuse. They found there was no need for additional research to establish criteria for DPR but provided six research recommendations to increase understanding of DPR further ensure that public health protections related to source control, final water quality monitoring, pathogen removal, and analytical methods to identify unknown contaminants. Significant progress in these research areas has been made since the panel's recommendations.

The SWRCB also convenes a science advisory panel on CECs in recycled water through the Recycled Water Policy. The policy includes a provision to reconvene a panel every five years to update monitoring recommendations for CECs. The panel provided its most recommendations in 2018 for monitoring for CECs in recycled water and potable reuse that are being incorporated into surface water augmentation projects.

In addition, DDW released *A Proposed Framework for Regulating Direct Potable Reuse in California* (SWRCB, 2019) that provides a regulatory approach for direct potable reuse and consideration of drinking water treatment plants. In December 2020, the SWRCB initiated the process to reconvene the DPR Expert Panel to advise in the development of regulations, as required AB 574. DDW plans to develop criteria concurrently for both raw water and treated drinking water augmentation.

Permitting of Potable Reuse Projects

Potable reuse projects require close collaboration between the San Diego RWQCB and DDW. Local groundwater recharge projects are permitted by the San Diego RWQCB under reclamation criteria or waste discharge requirements, with requirements from DDW incorporated to ensure the protection of public health. Groundwater projects will conform to the groundwater recharge criteria.

Local surface water augmentation projects are also permitted by the San Diego RWQCB for the discharge into local reservoirs. For any discharge to waters of the United States, a discharge permit meeting federal Clean Water Act requirements is required. The new advanced treated water supply is also regulated by DDW as a drinking water supply under the Safe Drinking Water Act. DDW's requirements are incorporated into the NPDES permits.

Importance of Science-Based Regulations

The primary obligation of all drinking water suppliers is to protect public health, and the Water Authority promotes the importance of research in regulation development. To instill confidence that the public's health is protected, drinking water suppliers are commit complying with all regulations to ensure drinking water is safe and to provide transparency so information about drinking water is broadly available to the public. Potable reuse projects will be required to achieve the same high standard of public health protection as any other drinking water supply.

Because of the high standards required for protecting public health and the extensive use of treatment technology to meet drinking water standards for potable reuse, science-based research is essential to the regulatory development process and to instilling public confidence.

The *California WaterReuse Action Plan* (WaterReuse, 2019) highlights research needed to ensure protection of public health as advanced forms of recycled water become widespread in the state. The *2020 Water Resilience Portfolio* (California Natural Resources Agency et al., 2020) also calls for continuing research underway identified in the DPR criteria feasibility report to the Legislature and convene an expert panel to review the proposed criteria to assure they are adequately protective of public health.

Funding of Potable Reuse Projects

The primary sources of outside funding available for potable reuse projects include Title XVI, Clean Water State Revolving Funds, the Water Recycling Funding Program, and the State's IRWM Grant Program. These funding sources are described in *Section 5.4.3 Encouraging Recycled Water Development*. Under the IRWM Grant Program, Propositions 50 and 84 have already provided support for potable reuse through the San Diego IRWM Program by funding the City of San Diego's water purification demonstration project, the Padre Dam MWD's potable reuse demonstration project, and the Failsafe Potable Reuse project. These projects provided the research necessary to move potable reuse forward in the San Diego region and in California. Proposition 84 also provided funding for the expansion of Padre Dam MWD's Ray Stoyer Water Reclamation Facility, which will increase supply availability for potable reuse projects. In 2020, the IRWM Program announced a Proposition 1 grant award to the San Diego region for a suite of projects that include the City of San Diego Pure Water Program and Pure Water Oceanside. Proposition 1 will provide funding for key components of the City of San Diego's Pure Water Program, which is the state's first potable reuse project via surface water augmentation. It will also provide support to Oceanside Pure Water, an indirect potable reuse project that will recharge the Mission Groundwater Basin with highly treated recycled water via injection wells.

5.5.2 Water Authority Activities in Support of Potable Reuse

For over 20 years, the Water Authority has been a staunch supporter and an active participant in advancing the goal of implementing potable reuse in the County. The Water Authority's more recent focus on efforts to advance potable reuse have been through advocacy for legislation and regulations that move projects forward in the near term. Water Authority staff has been prominently involved through participation in the national WaterReuse Association and WaterReuse California legislative and regulatory committees, and through other regulatory advocacy venues, including attending and providing comments at Expert Panel meetings by serving on stakeholder committee meetings, and advocating and supporting member agency interests.

The Water Authority has also been able to track trends in public acceptance of recycled water through its public opinion survey. This effort provides a foundation for member agency outreach and measures the effectiveness of those outreach efforts. In 2012, 71% of respondents believed that it was possible to further treat recycled water used for irrigation to make the water pure and safe for drinking. This was an increase over the 2011 survey findings where 66% of respondents felt that it is possible to further treat recycled water for drinking purposes. However, both the 2011 and 2012 survey results represent a substantial increase over the 2009 survey response where just 53% thought it was possible.

Water Authority staff has been supporting member agencies in three key areas: public outreach and messaging, engaging with regulatory agencies and the Expert Panel, and helping secure funding for local projects. While member agencies will lead the development of their own specific projects, the need continues for regional coordination and collaboration on potable reuse issues. Water Authority staff will continue to engage with member agencies and DDW to ensure that the regulatory framework developed by DDW and reviewed by the Expert Panel considers the wide range of approaches expected as part of member agency projects.

In addition, Water Authority staff has supported member agencies by actively engaging in public outreach in support of member agency projects. This support has included:

- Coordinate with member agencies through the Joint Public Information Committee to develop common outreach messaging that will support potable reuse projects.
- Coordinate with the member agencies through the Potable Reuse Coordination Committee and Recycled Water Workgroups.
- Outreach to the general public to increase public acceptance of potable reuse through presentations, development of handout materials and videos for public outreach events and use by the member agencies, and sharing of information through the Water Authority's website.
- Communicate with regional, local, state, and federal elected officials on the importance of potable reuse for the San Diego region to gain support for potable reuse.
- Communicate with SWRCB members and staff on the safety and importance of potable reuse.
- Collaborate with other organizations that support potable reuse including WaterReuse, the Water Reliability Coalition, and state and local environmental groups on common outreach to support potable reuse.
- Advocate at the state and local level for reasonable regulations that will support the safe use of recycled water for local potable reuse projects.
- Partner with the Southern California Water Coalition through its Recycled Water Task Force to develop public education and outreach videos on recycled water and potable reuse.

5.5.3 Projected Supply through Potable Reuse

The Water Authority worked closely with its member agencies to determine the projected yield from existing and planned potable water reuse projects. Table 5-8 shows the estimated verifiable annual yield from the projects in five-year increments based on the implementation schedules provided by the member agencies and the likelihood of development. These projected supply yields are included in the reliability analysis in *Section 9 Water Supply Reliability*.” Table F-5 in Appendix F lists these projects and projected supplies.

Table 5-8. Projected Potable Reuse Water Use (Normal Year, AFY)

2020	2025	2030	2035	2040	2045
--	33,042	53,202	112,562	112,562	112,562

The significant projected increase in potable reuse shown in Table 5-8 is from new potable reuse projects and facilities for Pure Water Oceanside, Pure Water San Diego, and the East County Advanced Water Purification Program (East County AWP).

The City of Oceanside began construction in 2020 to expand its existing recycled water system and develop an advanced water purification project known as Pure Water Oceanside. Pure Water Oceanside will purify recycled water from the San Luis Rey Water Reclamation Facility through advanced treatment to create a new local and high quality drinking water for the City. Water will be purified using filtration, reverse osmosis and ultraviolet light advanced oxidation, before it is injected into the Mission Basin Aquifer where it will blend with naturally occurring groundwater and recharge the aquifer. The water will be extracted and treated at the Mission Basin Groundwater Purification Facility before distribution to customers. Pure Water Oceanside is on track to be the first potable reuse project to deliver water in San Diego County, and will provide more than 30% of the City’s water supply.

The City of San Diego’s Pure Water San Diego is a phased, multi-year program that will produce purified water to supplement San Diego's drinking water supply. Phase 1, categorized as verifiable, is scheduled to be operational by 2025 and will produce up to 33,600 AFY by 2035 to the Miramar Reservoir for surface water augmentation. Tertiary treated water from the North City Water Reclamation Plant will be treated by the North City Pure Water Facility for delivery to the Miramar Reservoir. The purified water will blend in the reservoir with the City’s local and imported supplies and be treated at the Miramar Water Treatment Plant before distribution to customers. Phase 2, also categorized as verifiable, is scheduled to be operational by 2035 and will produce up to 59,360 AFY. By the end of 2035, Phases 1 and 2 will provide an ultimate program production capacity of 83 MGD which would provide one-third of San Diego's water supply. Pure Water San Diego will also reduce the amount of treated wastewater that is discharged to the ocean by more than 50%.

The East County AWP is a multi-phased surface water augmentation project that will purify East San Diego County’s recycled water to produce a new local and sustainable drinking water supply. The East County AWP was formed through a partnership between Padre Dam MWD,

Helix Water District, the County of San Diego, and the City of El Cajon. The project will be maintained and operated by Padre Dam MWD and owned by the East County AWP Joint Powers Authority (JPA). The JPA consist of Padre Dam MWD, the City of El Cajon and the County of San Diego that and was formed in November 2019 to serve as the program's governing body. The first phase is categorized as verifiable supply and will provide up to 12,880 AFY of purified water to Lake Jennings with an ultimate capacity of 15,680 AFY. It is scheduled to begin distributing water in 2025 and is expected to meet 30% of East County's current drinking water demands.

Conceptual Potable Reuse Projects

There are several conceptual potable reuse projects in the San Diego region. The North County One Water Program is part of a regional project formed by the north San Diego Water Reuse Coalition, a nine-member coalition of water and wastewater agencies, to maximize reuse in northern San Diego County through non-potable and potable reuse. In July 2018, the Encina Wastewater Authority released a *Water Reuse Feasibility Study* (2018), to study opportunities to increase reuse of its effluent through potable reuse. The report considered a centralized location for largescale production of recycled water could capture economies of scale to benefit the region. The North County One Water Program would reuse treated effluent form the Encina Water Pollution Control Facility and San Elijo Water Reclamation Facility, accounting for up to 21,500 AFY by 2035.

Conceptual potable reuse projects also include the City of Escondido's potable reuse project, Olivenhain MWD's San Dieguito River Basin Brackish Groundwater Recovery and Treatment project, and Vallecitos Water District's Meadowlark Water Reclamation Facility DPR project. Conceptual projects include subsequent phases of the East County AWP.

5.6 Member Agency Seawater Desalination Supply

5.6.1 Carlsbad Desalination Plant

In 2015 and 2016, Vallecitos Water District and Carlsbad Municipal Water District both entered into contracts with the Water Authority to purchase desalinated water. Vallecitos Water District and Carlsbad Municipal Water District currently purchase and plan to continue purchasing 3,500 and 2,500 AF per year respectively, representing a total 6,000 AF of water for member agency seawater desalination water supply annually.

5.7 San Luis Rey Water Transfer Supply

5.7.1 Supply Description

The San Luis Rey Water Transfer supply originated from the San Luis Rey Indian Water Rights Settlement Act, which was passed by Congress in 1988 to settle disputes between the Settlement Parties. The Settlement Parties are listed as follows:

- *Indian Bands* — The Indian Bands are comprised of the La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, and act through the governing bodies of each respective Band as recognized by the U.S. Secretary of the Interior
- *Local Entities* — The Local Entities are the City of Escondido and Vista Irrigation District
- *San Luis Rey Indian Water Authority*

Through the San Luis Rey Indian Water Rights Settlement Act, the U.S. authorized up to 16,000 AF per calendar year of conserved water from projects like lining portions of the AA and CC Canals for the Settlement Parties to resolve water right disputes on the San Luis Rey River.

Additionally, the Agreement for the Conveyance of Water Among the San Diego County Water Authority, the San Luis Rey Settlement Parties and the United States was entered into on October 10, 2003. This agreement established terms and conditions for the Supplemental Water Transfer deliveries that included obligation conditions, transportation rate, and creation of a delivery protocol document.

On December 5, 2014, the San Luis Rey Indian Water Rights Implementing Agreement was entered into by the City of Escondido, Vista Irrigation District, the State of California, the San Luis Rey River Indian Water Authority, and the Bands for the purpose of resolving all claims, controversies and issues involved in all of the pending proceedings among the parties.

The Water Authority is required to convey the supplemental water transfer supplied by the San Luis Rey Indian Water Authority to the City of Escondido and the Vista Irrigation District.

San Luis Rey Water Delivery

In 2017, the City of Escondido and Vista Irrigation District (i.e., the Local Entities) began receiving wheeled water deliveries from the San Luis Rey Indian Water Authority. Beginning September 2019, the San Pasqual Band began receiving a small portion of the supplemental water transfer wheeled through Valley Center Municipal Water District. Additionally, the Rincon Band recently exercised its exchange option as provided for in the San Luis Rey Indian Water Rights Implementing Agreement for exchange of City of Escondido and Vista Irrigation District local water supply for supplemental water provided to the Rincon Band. Total projected supplemental water transfers for the City of Escondido and Vista Irrigation District, under the San Luis Rey Indian Water Rights Settlement Act, are shown in Table 5-9.

Table 5-9. Projected Water Transfers (Normal Year, AFY)

2020	2025	2030	2035	2040	2045
15,800	15,800	15,800	15,800	15,800	15,800

5.8 References

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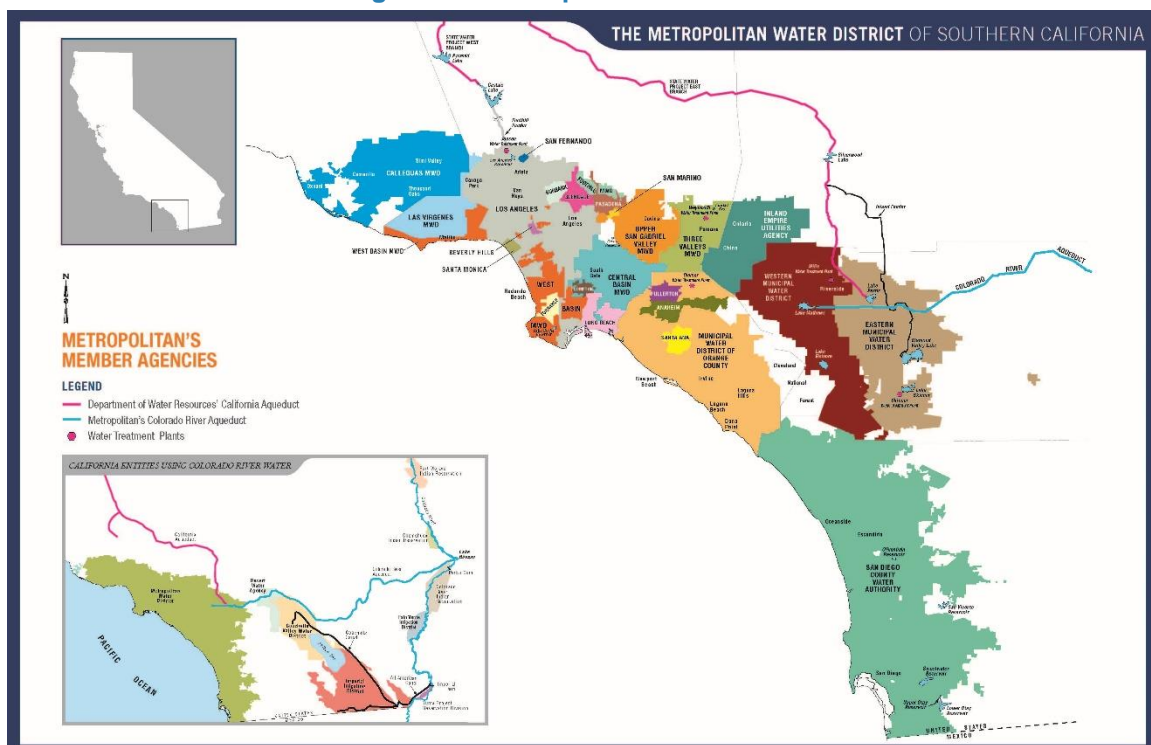
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SECTION 6 METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

6.1 Introduction

The Water Authority relies on water purchases from Metropolitan to meet its supplemental supply gap. Metropolitan was formed in 1928 to develop, store, and distribute supplemental imported water in Southern California for domestic and municipal purposes. Approximately 19 million people reside in Metropolitan's service area, which includes portions of Ventura, Los Angeles, Orange, San Bernardino, Riverside, and San Diego Counties. The Metropolitan service area, shown in Figure 6-1, covers a 70-mile wide strip of the Southern California coastal plain, extending from the city of Oxnard in the north to the Mexican border. About 40 to 50% of the water used in this 5,200-square-mile region is supplied by Metropolitan. The Water Authority, one of 26 Metropolitan member agencies, was historically the largest purchaser of Metropolitan water. However, as the Water Authority and its member agencies have increased their locally controlled water resources and investments in water use efficiency, the Water Authority's Metropolitan purchases have declined. In fiscal year 2020, the Water Authority purchased 62,852 AF, or about 6%, of all the water Metropolitan sold. The extent to which Metropolitan's member agencies rely upon Metropolitan supplies varies by the amount of local supplies available or each agency's own reliability goals. Water Authority demands on Metropolitan can be found in Appendix G.

Figure 6-1. Metropolitan Service Area



6.1.1 Metropolitan Act Section 135 - Preferential Right to Water

Under Section 135 of the Metropolitan Act, each member agency has a preferential right to Metropolitan water. The Metropolitan Act stipulates that member agencies' preferential rights to Metropolitan water are proportional to their respective total payments to Metropolitan, "excepting purchase of water." The preferential rights are calculated by including each agency's total historical payments to Metropolitan from property taxes, readiness-to-serve and capacity charges, transportation services charges, and other minor miscellaneous payments.

Metropolitan member agencies' respective abilities to exercise preferential rights were confirmed in a lawsuit filed by the Water Authority in 2001. The court decision affirmed the preferential right of each member agency, including the Water Authority, to Metropolitan water. How Metropolitan calculates its preferential rights, specifically regarding the Water Authority's payments to transport its independent Colorado River supplies, was clarified through the Water Authority's 2010 litigation challenging Metropolitan's rates. Following the finalization of the Appellate Court's ruling in 2017, Metropolitan updated how it calculates member agencies' preferential rights so they now include the Water Authority's payments for Metropolitan's transportation services. As of June 30, 2020, the Water Authority has a preferential right to purchase 25.83% of Metropolitan's water. As a comparison, the Water Authority purchased about 6% of the water Metropolitan sold in fiscal year 2020.

In Section 2.3 of its Final Draft 2020 UWMP, released in December 2020, Metropolitan presents its supply capability at the regional level, rather than at the member agency level. The report states that Metropolitan has supply capabilities that would be sufficient to meet expected demands under both the single driest year and the multiple dry-year hydrologies through 2045. The report lists Metropolitan's forecasted imported water supply capabilities under normal (defined by Metropolitan as a repeat of 1922-2017 hydrologic cycle), single driest year (repeat of 1977), and multiple dry-year (repeat of 1988-1992) hydrologies through 2045, which would provide the Water Authority with adequate supplemental imported supplies in normal years, a single dry year, and multiple dry years as shown in Section 9.3 and Section 9.4. In Metropolitan's Final Draft 2020 UWMP, Tables 2-4, 2-5, and 2-6, show supply capabilities for current imported water and in-region programs under normal year, single dry-year, and multiple dry-year conditions (Metropolitan, 2021).

6.2 Metropolitan's Water Supplies

Metropolitan obtains its water from two sources: the Colorado River via the CRA, which it owns and operates; and the State Water Project, with which Metropolitan has a water supply contract through the State of California. Figure 6-2 shows these imported water supply sources, and they are described later in this section. To manage challenges from dry hydrologic conditions and regulatory restrictions that limit supplies from the State Water Project, Metropolitan's strategy also includes using its storage programs to set aside excess supplies in wet years for use in dry years.

Figure 6-2. Major Water Conveyance Facilities Serving San Diego County



6.2.1 Colorado River

Metropolitan was originally formed to import water from the Colorado River. During the 1930s, Metropolitan built the CRA to convey this water, which was first delivered to Metropolitan's member agencies in 1941. The aqueduct is more than 240 miles long, beginning at Lake Havasu on the Arizona/California border and ending at Lake Mathews in Riverside County. The aqueduct has the capacity to deliver up to 1.25 million AFY. Figure 6-2 shows the location of the aqueduct.

Reliability Issues

Before 1964, Metropolitan had a firm annual allocation of 1.212 million AF of Colorado River water through contracts with the U.S. Department of the Interior, which was enough to keep Metropolitan's aqueduct full. However, as a result of the 1964 U.S. Supreme Court decision in *Arizona vs. California*, Metropolitan's firm supply fell to 550,000 AF, its basic annual

apportionment. Due to growth in demand from the other states and drought conditions, since 2003 Metropolitan's deliveries have been limited to its basic annual apportionment plus water resulting from unused apportionment water by other Colorado River water users, transfer programs resulting from conservation with senior water right holders, storage volumes from Lake Mead, and interstate water banking. The execution of the *2003 Quantification Settlement Agreement* (2003 QSA; Imperial Irrigation District et al., 2003), set up mechanisms for California Colorado water users to manage demands within its apportionment and to conserve and transfer water between willing buyers and sellers.

Water availability from the Colorado River is governed by a system of priorities and water rights that have been established over many years. The Colorado River Lower Basin states (i.e., California, Arizona, and Nevada) have an annual apportionment of 7.5 million AF of water divided as follows:

- California: 4.4 million AF
- Arizona: 2.8 million AF
- Nevada: 300,000 AF

Under the *2007 Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead* (2007 Interim Guidelines; U.S. Department of Interior, 2007), because California has senior water rights thus faces no reductions under the first, second, or third shortage triggers (Arizona and Nevada supplies are curtailed under all triggers). Shortages in the Lower Basin are triggered by Lake Mead's elevation dropping to certain elevations, with first, second, and third triggers occurring at elevations of 1,075 feet, 1,050 feet, and 1,025 feet, respectively. In 2019, *Drought Contingency Plans* were executed for the Upper and Lower Colorado River Basins to reduce the risk of Lake Powell and Lake Mead declining below critical elevations through 2026. The *Lower Basin Drought Contingency Plan* (Lower Basin DCP; Reclamation, 2019) requires California, Arizona, and Nevada to store defined volumes of water in Lake Mead at specified lake levels. California would begin making contributions if Lake Mead's elevation drops below 1,045 feet. Depending on the lake's elevation, California's Lower Basin DCP contributions range from 200,000 to 350,000 AFY, with Metropolitan responsible for 93%. As of August 2020, the 5-year projections of the likelihood of shortage and Lower Basin DCP triggers indicate it is unlikely Lake Mead will reach a level that requires contributions from California through 2025. Through the DCP, Metropolitan has the ability to deliver water stored as Intentionally Created Surplus (ICS) at Lake Mead elevations below 1,075 feet. As of January 2021, Metropolitan had approximately 1.3 million acre-feet of ICS water stored in Lake Mead. Both the *2007 Interim Guidelines* and the *Lower Basin DCP* expire in 2026. New operating agreements will be negotiated in the coming years that will govern shortage criteria and cutbacks beyond 2026.

The *1931 Seven Party Agreement* (Palo Verde Irrigation District et al., 1931) established California's priorities for water among the state's Colorado River contractors. The first four priorities total 4.4 million AFY. Metropolitan has priorities 4, 5(a), and 5(b) water listed in the

1931 Seven Party Agreement, but only priorities 1 through 4 of the *1931 Seven Party Agreement* are within California's basic annual apportionment. Metropolitan's fourth priority of 550,000 AF is junior to that of the first three priorities, 3.85 million AF to California agricultural agencies. Water used to satisfy Metropolitan's priorities 5(a) and 5(b) must come from unused allocations within California, Arizona, or Nevada, or from surpluses declared by the U.S. Secretary of the Interior.

Environmental Considerations

Several fish species and other wildlife species either directly or indirectly have the potential to affect Colorado River operations, including changing power operations and the amount of water deliveries to the CRA. A number of species that are on endangered or threatened lists under the federal or California Endangered Species Acts (ESAs) are present in the area of the Lower Colorado River. To address species-related impacts on Colorado River operations, a broad-based state/federal/tribal/private regional partnership, which includes water, hydroelectric power, and wildlife management agencies in Arizona, California, and Nevada, developed a multi-species *Lower Colorado River Habitat Conservation Plan* (Lower Colorado River Multi-Species Conservation Program, 2004) for the main stem of the Lower Colorado River. Finalized in December 2004, this 50-year plan allows Metropolitan to obtain federal and state permits for any incidental take of protected species resulting from current and future water and power operations and diversions on the Colorado River. The *Lower Colorado River Habitat Conservation Plan* also covers operations of federal dams and power plants on the Colorado River, and the change in point of diversion on the river for the Water Authority's conserved water transfer and canal lining projects.

Water Quality Considerations

Please see *Section 7 Water Quality*, for more information.

Current Supplies

Per the *1931 Seven Party Agreement*, Metropolitan's annual Colorado River supply is 550,000 AF from its fourth priority within California's basic apportionment of 4.4 million AF. With the *2003 QSA* and related agreements among the Imperial Irrigation District, the Coachella Valley Water District, State of California, Department of Interior, Metropolitan, and the Water Authority, a plan was formalized on how California will implement water transfers and supply programs that allow California to live within the state's 4.4 million AF basic annual apportionment of Colorado River water. Because Metropolitan's other imported supply source, the State Water Project, does not have ample system storage, faces regulatory and operational uncertainties, and is more susceptible to hydrologic challenges, Metropolitan has relied on its land fallowing, storage, and exchange programs to increase its Colorado River supplies. Major programs include Metropolitan's Intentionally Created Surplus account in Lake Mead, interstate exchange program with the Southern Nevada Water Authority, Palo Verde Irrigation District Land Fallowing Program, and Imperial Irrigation District/Metropolitan Conservation Program.

Quantification Settlement Agreement and Future Supplies

The 2003 QSA and related agreements, executed in October 2003, resolved longstanding disputes regarding Colorado River water use among agencies, and established a baseline water use for Imperial Irrigation District, Coachella Valley Water District, and Metropolitan. This permitted implementation of a variety of water conservation and transfer agreements, including the Water Authority's transfer agreement with Imperial Irrigation District. The 2003 QSA also provides that the Coachella Valley Water District and Metropolitan put aside, for the term of the agreement, a dispute over beneficial use of water by Imperial Irrigation District; and that Metropolitan would forbear consumptive use of water to permit the Secretary of Interior to satisfy the uses of the non-encompassed water delivered to holders of present perfected rights.

See *Section 4.2 Water Authority—Imperial Irrigation District Water Conservation and Transfer Agreement*, for more information on the QSA.

Metropolitan limits Colorado River supply deliveries, which include the Water Authority's Imperial Irrigation District transfer and conserved canal lining water, to 1.25 million AF to match its maximum CRA delivery capacity. From 2025 through 2045, Metropolitan's final draft 2020 UWMP estimates CRA deliveries, which include the Water Authority's Imperial Irrigation District transfer and conserved canal lining water, between:

- 891,000 AF and 1,250,000 AF in a normal year;
- 1,015,000 AF and 1,250,000 AF in a single dry-year; and
- 1,015,000 AF and 1,250,000 AF under multiple dry-year hydrology.

6.2.2 State Water Project

The State Water Project is owned by the State of California and is managed and operated by DWR. Metropolitan has a take-or-pay supply contract with the State of California and is entitled to take about 46% of available State Water Project water through its long-term State Water Project water supply contract (referred to as the Table A allocation). The State Water Project stretches for more than 600 miles from Lake Oroville in the north to Lake Perris in the south. Water is stored at Lake Oroville and released when needed into the Feather River, which flows into the Sacramento River and to the San Francisco Bay/Sacramento-San Joaquin Delta (Delta). The Delta is the largest estuary on the U.S. west coast supporting over 750 species of animals and plants, including many endangered or threatened species, and is used for multiple purposes, including agriculture, recreation, and fishing. The Delta also provides the means to deliver water from Northern California to Southern California. In the north Delta, water is pumped into the North Bay Aqueduct for delivery to Napa and Solano Counties. In the south Delta, water is diverted into the State Water Project's Harvey O. Banks Pumping Plant, where it is lifted into the 444-mile long California Aqueduct. Some of this water flows into the South Bay Aqueduct to serve areas in Alameda and Santa Clara Counties. The remainder flows southward

to cities and farms in Central and Southern California. In the winter, when demands are lower, water is stored at the San Luis Reservoir located south of the Delta. State Water Project facilities provide drinking water to 27 million Californians and 750,000 acres of irrigated farmland. Figure 6-2 shows the California Aqueduct.

Operational Considerations

The reliability of State Water Project supplies is limited by the level of State Water Project supply development, pumping restrictions due to state and federal environmental regulations, the effects of climate change, and hydrology. When approved by voters in the 1960s, the State Water Project was planned to deliver a maximum of 4.2 million AFY to 32 contracting agencies. Subsequent contract amendments reduced the total contracted amount to 4.13 million AFY and the number of contracting agencies to 29. Metropolitan's contracted entitlement is currently 1,911,500 AFY. Metropolitan's original long-term water supply contract for 2,011,500 AFY was amended as part of the 2003 QSA. Effective in 2005, the amendment resulted in an exchange agreement among Coachella Valley Water District, Desert Water Agency, and Metropolitan. The exchange agreement provides for the transfer of 88,100 AF of Metropolitan's Table A amount to Coachella Valley Water District and 11,900 AF of Metropolitan's Table A amount to Desert Water Agency.

When voters approved construction of the State Water Project in 1960, state planners did not expect the full amount of contracted water to be needed for at least the first 20 years of the project. As a result, planners anticipated that the facilities, such as a Peripheral Canal to divert water around the Delta, needed to produce the full contracted amount would be constructed over time as demands on the system increased. However, decisions about these additional facilities were repeatedly deferred as public attitudes and environmental regulations changed and costs increased. New state and federal environmental laws put some potential water supply sources off limits to development. Additionally, more stringent water quality standards adopted by the SWRCB to protect the Delta reduced the amount of water available for diversion. Environmental challenges to the State Water Project operations and the resultant regulations have further eroded export capability. At the same time, California's population and water demand continued to grow.

In 2006, through Executive Order S-17-06, Governor Schwarzenegger established the Delta Vision process, which aimed to identify long-term solutions to resolve resource conflicts in the Delta, including those concerning natural resources, infrastructure, land use, and governance issues. In an effort to meet Delta Vision's recommendation to restore habitat in the Delta in a way that reliably delivered water, the California Natural Resources Agency initiated preparation of the Bay Delta Conservation Plan (BDCP).

In 2009, the State of California passed SB X7-1, the Delta Reform Act. The Water Authority, a strong advocate for a sustainable Delta solution, actively encouraged passage of the Delta Reform Act that, along with other bills, made up a comprehensive package of water legislation.

The Delta Reform Act established the state policy to reduce reliance on the Delta and directed the Delta to be managed with co-equal goals of water supply reliability and ecosystem protection. The legislation also created the Delta Stewardship Council and charged the council with adopting and overseeing implementation of *The Delta Plan* (Delta Stewardship Council, 2013), a comprehensive Delta management plan.

The BDCP was originally envisioned as a joint Habitat Conservation Plan (HCP)/NCCP intended to meet the state-mandated co-equal goals of restoring and protecting ecosystem health, water supply, and water quality within a stable regulatory framework. However, following extensive public feedback, DWR and the co-lead federal agencies changed the permitting approach and decoupled BDCP's water conveyance and ecosystem restoration objectives into two distinct efforts: California WaterFix and California EcoRestore. Instead of pursuing the long-term 50-year HCP/NCCP permits, California WaterFix was proposed to operate under Section 7 of the federal ESA and corresponding state regulations, a species by species permit mechanism. California WaterFix was comprised of three new intakes and two twin 30-mile long tunnels able to move up to 9,000 cfs of water under the Delta from the north to the existing aqueduct systems in the south Delta, and it would work as a dual system with the existing Delta waterway for State Water Project and Central Valley Project exports.

With the election of Governor Newsom, the state moved away from the twin-tunnel California WaterFix in favor of a water resilience portfolio approach, including a single-tunnel Delta Conveyance Project. Similar to California WaterFix, the Delta Conveyance Project would work as a dual system with the existing waterway but would contain a single tunnel with two new intakes capable of conveying 6,000 cfs. DWR is preparing a draft Environmental Impact Report (EIR) to circulate to the public with a plan to finalize the EIR in 2023. Project permitting is expected to be completed in 2024. In June 2020, the U.S. Army Corps of Engineers informed DWR that it will prepare a stand-alone Environmental Impact Statement (EIS) under its regulatory authority over activities within waters of the U.S., which is expected to be completed in step with the EIR. Once the EIR and EIS are complete, project permits are obtained, and DWR approves a final project, then tunnel construction, which is expected to last 13 years, can begin. Various other permits and approvals necessary to commence construction remain to be obtained. In August 2020, it was announced that the preliminary cost assessment for a 6,000 cfs Delta Conveyance Project is \$15.9 billion (in undiscounted 2020 dollars).

In December 2018, DWR and Reclamation signed an *Addendum to the Coordinated Operation Agreement* (United States of America et al., 2018), which governs how the State Water Project and the Central Valley Project are jointly operated. The original Coordinated Operation Agreement was adopted in 1986 and defines how the State Water Project and the Central Valley Project would achieve the following:

- Optimize exchange of water and services;
- Optimize exports, including storage releases; and
- Meet regulatory obligations.

The *2018 Addendum* was the first update since the Coordinated Operation Agreement's adoption and incorporates the effects of new facilities and regulations. The *2018 Addendum*, which currently faces a legal challenge, shifts exports from the State Water Project to the Central Valley Project in varying amounts based on year type. Based on the Bureau of Reclamation's environmental assessment for the 2018 Addendum (Reclamation, 2018a), the State Water Project will lose approximately 113,000 AF during average years and approximately 207,000 AF during dry years. About half of this reduction in water supply for State Water Project contractors will impact Metropolitan's water supply.

DWR's *State Water Project Delivery Capability Report 2019* updated DWR's estimate of the current State Water Project delivery capability through 2040 (DWR 2019a). Historically, the *State Water Project Delivery Capability Report* estimated the current and future (i.e., 20 years in the future) State Water Project delivery capability. The *State Water Project Delivery Capability Report 2019* showed that current deliveries continue to be impacted by significant restrictions due to operational requirements contained in federal BiOps and the *2018 Addendum* between the state and federal water projects. The report projected that the reliability of the annual State Water Project deliveries will be slightly less (58%) when compared to the preceding 2017 report, primarily as a result of the Coordinated Operation Agreement addendum.

In developing its supply capabilities, Metropolitan does not assume the implementation of the Delta Conveyance Project. Metropolitan also assumed near-term actions that would provide annual State Water Project Table A supplies of 1,095,000 AF in normal years.

Environmental Considerations

In recent years, actions taken to protect the ecosystem of the Delta have placed additional restrictions on State Water Project operations; 150 years of human activity dating back to 19th century gold mining has taken its toll on the Delta ecosystem and the fish that live there.

Numerous factors contribute to the degradation of the Delta ecosystem and the decline of its fisheries, such as habitat loss, water diversions, non-point source pollution, over-fishing, and the introduction of non-native species. The 2008 and 2009 BiOps issued by the USFWS and NMFS, respectively, increased restrictions on State Water Project exports. USFWS and NMFS issued updated BiOps on the impacts of the State Water Project and Central Valley Project on Delta smelt, salmon, green sturgeon, and steelhead species in October 2019 (USFWS 2019; NMFS 2019). These *2019 BiOps*, which were adopted by Reclamation in February 2020, contain flow requirements, operational changes to increase flexibility, and investments in science, habitat and other projects. The *2019 BiOps* aim to maximize exports from the Delta and could lead to increased State Water Project exports by an average of 200,000 AFY in comparison to current conditions depending on hydrologic and other conditions. However, on February 20, 2020, the State of California sued USFWS, NMFS, Reclamation, and other federal figures over alleged violations of federal law to block the *2019 BiOps* from going into effect. The State Water Contractors, of which Metropolitan is the largest, intervened as a defendant in the litigation. On

May 11, 2020, the U.S. District Court for Eastern District of California granted a preliminary injunction through May 31, 2020 in the State's favor.

In November 2019, DWR released an EIR for long-term operations of the State Water Project to ensure its operations comply with the California Endangered Species Act (DWR, 2019b). On March 27, 2020, DWR certified the Final EIR. Based on the EIR, the California Department of Fish and Wildlife issued DWR a permit allowing it to operate the State Water Project under new rules that contain more restrictions than their federal counterparts and reduce State Water Project deliveries in comparison to the BiOps, resulting in a net increase of 40,000 AFY on average from both sets of operating rules. Inconsistencies between the new operating rules of the State Water Project and Central Valley Project have led several parties—including California; several State Water Project and Central Valley Project contractors, including Metropolitan; and non-governmental organizations—to litigate. Currently, the State Water Project is being operated under the 2020 State permit. Any resulting changes to the operating rules may have further impacts on State Water Project exports.

Water Quality Considerations

The SWRCB is the agency responsible for setting water quality standards and administering certain water rights throughout California. SWRCB decisions can affect the availability of water to users of State Water Project water, including Metropolitan. SWRCB exercises its regulatory authority over the Delta by means of public proceedings leading to regulations and decisions. These include the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (WQCP) (SWRCB, 2018), which establishes the water quality standards and proposed flow regime of the estuary, and water rights decisions that assign responsibility for implementing the objectives of the WQCP to users throughout the system by adjusting their respective water rights. Since 2000, the SWRCB's Water Rights Decision 1641, which aims to ensure that specified Delta water quality objectives in the most recent WQCP are met, has governed the State Water Project's ability to export water from the Delta for delivery to State Water Project contractors. The SWRCB is updating the WQCP via two separate processes, called plan amendments. In December 2018, the SWRCB adopted flow objectives for the first set of amendments to flow and water quality objectives for the Lower San Joaquin River and its three salmon-bearing tributaries—the Stanislaus, Tuolumne, and Merced Rivers—revised salinity water quality objectives in the southern Delta, and a program of implementation.

Concurrently, the SWRCB is considering amendments focused on the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes and Mokelumne Rivers), Delta outflows, and interior Delta flows. The SWRCB published the framework for the Sacramento/Delta update based on unimpaired flow in June of 2018. At the same time, state, federal, and local water agencies and non-governmental organizations are negotiating a set of voluntary agreements to implement the goals of the WQCP through new habitat, flows, and funding for environmental projects and science programs rather than relying solely on increased flows. On February 4, 2020, Governor Newsom's administration released a

framework for these agreements. Metropolitan is participating in SWRCB's proceedings and voluntary agreement discussions.

Please see *Section 7 Water Quality*, for other information.

Current Supplies

Metropolitan's State Water Project supplies are projected using DWR's *2019 State Water Project Delivery Capability Report* (DWR, 2019a). This report presents current DWR estimates of the amount of water deliveries under current 2019 conditions and under projected conditions over the next 20 years. In the *2019 State Water Project Delivery Capability Report*, delivery estimates for the State Water Project under 2019 conditions, with existing conveyance and low outflow, as a percentage of Table A amounts for Metropolitan, are 7% under single dry-year conditions (equivalent to 134,000 AF) and 58% under long-term normal conditions (equivalent to 1,100,000 AF).

To address supply needs under dry, below-normal conditions caused by dry hydrologic conditions and regulatory restrictions, Metropolitan developed additional supplies from Central Valley storage and transfer programs. From 2025 through 2045, Metropolitan's final draft 2020 UWMP estimates that the State Water Project's current programs, which include transfers and storage withdrawals, will be capable of serving to Metropolitan between:

- 1,831,000 AF and 1,838,000 AF in a normal year;
- 660,000 AF and 675,000 AF in a single dry-year; and
- 761,000 AF and 766,000 AF under multiple dry-year hydrology.

6.2.3 Storage Management Programs

Metropolitan relies on water in storage to augment imported supplies. It manages its storage portfolio by storing water during excess supply years to meet the region's needs when Metropolitan's imported water supplies are insufficient to meet annual needs, or if imported water facilities are damaged during a seismic event or other emergency. The amount of water in Metropolitan's storage influences the likelihood that Metropolitan will have adequate supplies to meet projected demands, as well as whether and to what degree it will implement its *Water Supply Allocation Plan* (WSAP). The principles that guide the management of supply and storage are based on the framework established in Metropolitan's *Water Surplus and Drought Management Plan* (Metropolitan, 1999). Currently, Metropolitan has several storage programs in operation that provide flexibility to meet delivery requirements. The storage accounts include groundwater and surface storage programs and facilities within and outside of Metropolitan's service area. Metropolitan's dry-year storage portfolio has the potential to store more than 5 million AF. Metropolitan's dry-year storage was at its highest level—3.2 million AF—at the end of calendar year 2020. Although Metropolitan currently employs its WSAP to allocate supplies, the imposition of the WSAP does not supersede a member agency's

preferential right to Metropolitan water. A member agency can always choose to exercise its preferential right to Metropolitan water rather than follow the WSAP allocation.

From 2025 through 2045, Metropolitan's final draft 2020 UWMP indicates that the in-region storage supplies and programs target for "current programs" will be capable of producing between:

- 875,000 AF and 880,000 AF in a normal year;
- 875,000 AF and 880,000 AF in a single dry-year; and
- 192,000 AF and 199,000 AF under multiple dry-year hydrology.

Metropolitan's ability to utilize its water storage reserves depends on the actual amount of water in storage, facility limitations, the location of the storage, and "take" or "exchange" limits of various storage/exchange programs. For example, access to storage on the State Water Project system may be restricted due to low State Water Project allocations limiting Metropolitan's ability to "take" Central Valley groundwater storage programs via exchange. On the Colorado River, Metropolitan's access to its Intentionally Created Surplus stored in Lake Mead may be limited by available capacity in its CRA, implementation of the Lower Basin Drought Contingency Plan, or the elevation of Lake Mead dropping below 1,025 feet. Related to Metropolitan's in-region storage programs, withdrawals from groundwater Conjunctive Use Programs may be limited by agreement provisions or overlaying agencies' demand for Metropolitan water. Additionally, during droughts, there may be limited water available for transfers, which may constrain Metropolitan's ability to secure additional supplies.

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SECTION 7 WATER QUALITY

7.1 Introduction

The UWMP Act requires that this 2020 UWMP include information, to the extent practicable, about the quality of existing water supply sources and the manner in which water quality affects their reliability. Significant tasks for the Water Authority are to protect the quality of the water passing through its delivery system and communicate water quality changes to its member agencies. This section introduces each water source and summarizes the water quality issues associated with those supplies that serve the San Diego region.

To note, information about Colorado River and State Water Project supplies came in part from Metropolitan's 2020 UWMP (Metropolitan, 2021). Water agencies treat all source water to meet stringent state and federal drinking water standards before delivering it to customers. However, source water of poor quality makes it expensive and difficult to meet those standards, while updated drinking water standards also result in additional costs to water suppliers.

7.2 Background on Key Water Quality Constituents

To identify and measure water quality issues, the EPA establishes federal primary and secondary maximum contaminant levels (MCLs) in drinking water for the nation. The DDW establishes primary and secondary MCLs for California, which must be at least as stringent as the federal MCLs. A secondary MCL is an enforceable standard based on the aesthetic quality of water. A primary MCL is an enforceable standard set based on health effects. All MCLs take into consideration health effects, occurrence, and cost of treatment. The State Office of Environmental Health Hazard Assessment establishes public health goals (PHGs), which set a goal for contaminants based strictly on health effects.

For water quality constituents that have no MCLs, EPA can set monitoring requirements through the Unregulated Contaminant Monitoring Rule. Where no MCLs are adopted, EPA can also set unenforceable health advisory levels, and DDW can set health-based notification levels and response levels that generally stay in place unless replaced by an MCL. If a chemical exceeds its DDW notification level, there are specific recommendations and requirements to notify local governing bodies and their consumers. DDW recommends that drinking water systems take a source out of service if a chemical is present at levels higher than the response level.

The following sections describe water quality constituents that affect drinking water supplies, including salinity, nutrients, total organic carbon and bromide, arsenic, uranium, chromium-6, perchlorate, iron and manganese, and constituents of emerging concern.

7.2.1 Salinity

The recommended secondary MCL for salinity is 500 milligrams per liter (mg/L) of Total Dissolved Solids (TDS) with an upper limit of 1,000 mg/L. High salinity concentrations can have economic impacts on various water uses, such as reduced lifespan of household appliances, reduced crop yields, and increased water use for irrigation to flush salts through the soil. When treatment is required to reduce TDS concentrations, the costs of supplying water likely increases. High TDS concentrations have an even greater impact on recycled water supplies, which have TDS concentrations approximately 200 to 300 mg/L higher than a source water supply.

Metropolitan has set a goal of delivering water to its customers that contains less than 500 mg/L TDS by blending water from State Water Project with Colorado River water as Colorado River water has significantly higher TDS than State Water Project water. Metropolitan has typically been able to operate to meet their 500 mg/L TDS goal. However, during drought periods when State Water Project supplies are limited and TDS concentrations are increasing in the Colorado River, this goal has not been met. Developing new sources of water supply with lower TDS concentrations, such as seawater desalination and potable reuse, can result in multiple economic benefits. At the same time, extremely low TDS concentrations in a water supply can result in water that is corrosive and should be managed to avoid unintended consequences.

7.2.2 Nutrients

Elevated levels of nutrients (i.e., phosphorus and nitrogen compounds) can stimulate nuisance algal growth in the form of cyanobacteria and aquatic weeds. These nutrients affect water system operations and consumer acceptability by creating noxious taste and odor compounds, and algal toxins. Additionally, algae growth can shorten water filtration run times, increase solids production at drinking water plants, and add to organic carbon loading. These nutrients also provide an additional food source that can lead to proliferation of quagga and zebra mussels and other invasive species.

Due to increasing occurrences, algae toxins are now a national issue. In August 2014, an algae bloom producing microcystins in Lake Erie resulted in a “do not drink” order for the city of Toledo, Ohio. This triggered federal legislation requiring USEPA to develop health advisories and strategic plans for managing algae toxins. In June 2015, USEPA issued health advisories for two cyanobacterial toxins, recommending exposure levels over a 10-day period at or below 0.3 micrograms per liter (µg/L) for microcystins and 0.7 µg/L for cylindrospermopsin in drinking water for children pre-school age and younger (i.e., less than six years old). For school-age children through adults, the recommended health advisory levels for drinking water are at or below 1.6 µg/L for microcystins and 3.0 µg/L for cylindrospermopsin. These health advisories serve as recommended precautionary levels and are not enforceable federal water quality standards. Additional work is being done to improve laboratory methods for monitoring of

algae species and any associated algae toxins, including microcystins, anatoxin-a, and cylindrospermopsin. From 2018 to 2020, monitoring for nine cyanotoxins and one cyanotoxin group has been required through the Unregulated Contaminant Monitoring Rule regulations. The Water Research Foundation has conducted research and provided recommendations for controlling algae growth in reservoirs and treatment approaches that can help avoid delivery of unacceptable levels of algae toxins in treated water supplies (Water Research Foundation, 2009).

7.2.3 Total Organic Carbon and Bromide

Disinfection byproducts (DBPs) form when source water containing high concentrations of total organic carbon (TOC) and bromide is treated with disinfectants such as chlorine or ozone. Source water quality and surface water treatment processes play an important role in DBP formation. A link between DBP exposure and certain cancers has been shown in health studies. EPA rules on DBPs attempt to balance the reduction in risk of waterborne disease outbreak through use of disinfectants against the cancer risk of DBP formed during water treatment processes.

- In 2002, EPA's Stage 1 Disinfectant and Disinfection Byproducts Rules established new MCLs for DBPs and a treatment technique requirement.
- In 2006, the Stage 2 Disinfectant and Disinfection Byproducts Rule added a requirement for treatment systems to comply with the MCL based on locational running averages. The MCL applies to suppliers with permitted water treatment facilities and consecutive systems receiving treated water from a wholesale provider.

7.2.4 Arsenic

Arsenic is a naturally occurring element found in rocks, soil, water, and air. It is also used in wood preservatives, alloying agents, agricultural applications, semi-conductors, paints, dyes and soaps. Long-term exposure to high concentrations of arsenic in drinking water have been linked to certain cancers, skin pigmentation changes, and hyperkeratosis (i.e., skin thickening). In California, naturally occurring arsenic is commonly found in drinking water sources. Arsenic can be removed from drinking water through coagulation and filtration processes. Effective January 2006, the federal MCL for arsenic was lowered from 50 µg/L to 10 µg/L, sharply reducing the acceptable level. The detection limit for purposes of reporting (DLR) is 2 µg/L. Arsenic levels in Metropolitan's water treatment plant effluents ranged from non-detect to 3.3 µg/L.

7.2.5 Uranium

Uranium is a naturally occurring radioactive element commonly found in groundwater supplies developed in granitic geological formations. Concentrated uranium can also be found in tailings from mining operations and their downstream water supplies. Uranium has been shown to cause certain cancers. The California MCL for uranium is 20 picocuries per liter (pCi/L) or 30 µg/L.

7.2.6 Chromium-6

Chromium is a naturally occurring element found in rocks, soils, plants, and animals. Chromium-6 is used in electroplating, stainless steel production, leather tanning, textiles manufacturing, dyes and pigments, and wood preservation. Chromium can be found in the form of chromium-3 or chromium-6. Chromium-6 has been shown to cause certain cancers. Effective July 1, 2014, DDW adopted an MCL of 10 µg/L for chromium. On May 31, 2017, however, this MCL was invalidated by the Superior Court of Sacramento County for failure to properly consider the economic feasibility of complying with the MCL. DDW is developing a new MCL with a more robust economic analysis. The federal MCL of 100 µg/L is also being reevaluated.

7.2.7 Perchlorate

Perchlorate compounds are used as a main component in solid rocket propellant and are found in munitions and fireworks. Perchlorate dissolves easily and is highly mobile in groundwater. The primary health concern of perchlorate is that it causes hypothyroidism. This is especially critical for pregnant women and in the development of infants and small children. In 2007, DDW adopted an MCL of 6 µg/L for perchlorate. In 2015, the PHG for perchlorate was set at 1 µg/L, prompting DDW to initiate a review of the MCL based on the current PHG. In October 2020, the SWRCB adopted a lower perchlorate detection limit for purposes of reporting to gather additional occurrence data for consideration as part of an MCL review process. The limit was lowered to 2 ppb and would decrease to 1 ppb in January 2024 pending final approval of the rulemaking by the state's Office of Administrative Law.

At the federal level, in July 2020 the USEPA decided not to establish a federal MCL. USEPA determined that perchlorate does not meet the criteria for regulation as a drinking water contaminant under the Safe Drinking Water Act (SDWA) because state and local water systems are effectively and efficiently managing perchlorate.

7.2.8 Iron and Manganese

Iron and manganese are commonly occurring groundwater contaminants. Manganese is also commonly occurring in the anoxic zone of surface water reservoirs and is found in wastewater discharges. High concentrations of iron or manganese in source waters can result in additional treatment removal costs. The secondary MCL for iron is 0.3 mg/L; the secondary MCL for manganese is 0.05 mg/L.

7.2.9 Constituents of Emerging Concern

Constituents of emerging concern (CECs) are new and emerging contaminants that have no adopted state or federal MCL where health effects information or the ability to monitor the contaminant may be limited. Three significant CEC categories are nitrosamines, pharmaceuticals and personal care products, and microplastics. Other CECs that may impact

drinking water supplies are per- and poly-fluoroalkyl substances (PFAS) and 1,2,3-trichloropropane (TCP) (discussed below).

Nitrosodimethylamine (NDMA)

NDMA is the most abundantly detected nitrosamine. NDMA is a DBP composed of chloramines and organic matter. Chloramines are a common secondary disinfectant at surface water treatment plants. Contributing factors to their formation may include organic matter in wastewater discharges or surface water supplies, and certain coagulant aid polymers. EPA considers NDMA to be a probable human carcinogen and put it on the monitoring list for the Unregulated Contaminant Monitoring Rule. The notification level for NDMA and two other nitrosamines is 0.01 µg/L. The PHG for NDMA is 0.003 µg/L.

Pharmaceuticals and Personal Care Products (PPCPs)

Pharmaceuticals and personal care products (PPCPs) are substances used by individuals for personal health reasons and products used to increase the growth or improve the health of livestock. A variety of PPCPs for human use are discharged on a continual basis into wastewater treatment plants. PPCPs have also been detected in extremely low concentrations in raw surface water supplies downstream of waste discharges in the form of the following: carbamazepine, sulfamethoxazole, caffeine, primidone and gemfibrozil. In 2010 – 2012, the San Diego RWQCB completed a pilot study of PPCPs in San Diego region freshwater systems under its Surface Water Ambient Monitoring Program (SWRCB, 2010). Additional research is needed on monitoring methods, health effects, or fate and transport of these constituents and the efficacy of treatment processes to remove the constituents.

Microplastics

In September 2018, Senate Bill 1422 directed the SWRCB to adopt a definition of microplastics by July 2020 and a standardized four-year testing methodology by July 2021. In March 2020, SWRCB defined “microplastics in drinking water” as solid, polymeric materials to which chemical additives or other substances may have been added, which are particles which have at least two dimensions that are greater than 1 and less than 5,000 micrometers (SWRCB, 2020a). In late 2020, the SWRCB was working with the Ocean Protection Council, the Southern California Coastal Water Research Project, San Francisco Estuary Institute, and University of Toronto to assess the available toxicological studies on microplastics to support development of a health-based guidance level for microplastics in drinking water.

Per- and Poly-Fluoroalkyl Substances (PFAS)

PFAS are a large group of humanmade chemicals that have been widely used in consumer products, fire-retarding foam, and industrial processes due to their resistance to heat, water, and oil. Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are two of the most extensively studied PFAS, which were widely used but are no longer manufactured or imported into the U.S. PFAS are stable in the environment, can bioaccumulate in the body, and

have been associated with adverse health impacts. PFAS have been detected in air, water, and soil in and around manufacturing facilities. PFAS that enter groundwater can contaminate drinking wells.

- From 2013 to 2015, under Unregulated Contaminant Monitoring Rule 3, the USEPA required water systems to monitor for PFOS and PFOA. In May 2016, the USEPA issued a lifetime health advisory for PFOS and PFOA in drinking water of 70 parts per trillion (ppt) in community water supplies. USEPA recommended customer notification when drinking water supply PFOS and PFOA concentrations exceed the health advisory. In February 2019, the USEPA released a PFAS Action Plan to outline steps the agency is taking to address PFAS and to protect public health (USEPA, 2019).
- In July 2018, DDW established an interim notification level (NL) of 14 ppt for PFOA and 13 ppt for PFOS, and a single response level of 70 ppt for the combined concentrations of PFOA and PFOS. These notification levels were revised by DDW in August 2019 to 6.5 ppt for PFOS and 5.1 ppt for PFOA. On February 6, 2020, DDW issued updated response levels (RL) of 10 ppt for PFOA and 40 ppt for PFOS based on a running four-quarter average. DDW has initiated the process of setting MCLs for PFASs.
- In early 2019, DDW began implementing a three phase multi-year investigative study to better understand the extent of PFAS contamination and data gaps in California. In January 2020, Assemble Bill 756 went into effect, requiring water suppliers to notify consumers for PFAS detected above notification levels and authorizing the SWRCB to exercise broader authority to order PFAS sampling. DDW has issued monitoring and reporting orders to public water systems, industrial sites, airports, and publicly owned treatment works (SWRCB, 2020a).

Management options for controlling PFAS include treatment or removing individual wells from service. USEPA has identified effective technologies to remove PFAS from drinking water that include activated carbon treatment, ion exchange resins, and high-pressure membrane systems, such as nanofiltration or reverse osmosis.

1, 2, 3-Trichloropropane (TCP)

TCP is a humanmade chemical found at industrial or hazardous waste sites. TCP has been used as a cleaning and degreasing solvent and with pesticide products. It is a probable human carcinogen. TCP is persistent in groundwater and has contaminated drinking water wells throughout the state, primarily in the Central Valley. Treatment for TCP is via granular activated carbon filtration. There is no federal MCL for TCP. In July 2017 the SWRCB adopted an MCL of 5 0.005 µg/L and required water agencies to conduct monitoring. Neither the Water Authority nor Metropolitan (Metropolitan, 2021) have detected TCP in its system.

7.3 Colorado River

The Colorado River is the primary imported water source for the Water Authority. High salinity concentrations (also referred to as TDS), uranium, and perchlorate contamination represent the primary areas of concern in Colorado River water quality. Managing the Colorado River watershed has been the most effective method for controlling these elements of concern.

The water quality issues are shown below in order of their magnitude for this supply.

7.3.1 Salinity

Salinity in the form of high TDS concentrations in the Colorado River system are indigenous and pervasive, mostly resulting from saline sediments in the Colorado River basin that were deposited in prehistoric marine environments. These indigenous salts are easily eroded, dissolved, and transported into the river system. Progressive agricultural development and water diversions over the past 50 years have also increased already high, naturally occurring TDS concentrations in the Colorado River.

Colorado River water salinity has averaged approximately 630 mg/L since 1976. Salinity is variable depending on hydrologic conditions. During the high-water flows from 1983 to 1986, salinity in the CRA dropped to a historic low of 525 mg/L. However, during the 1987 to 1992 drought, higher salinity concentrations returned. High TDS concentrations in water supplies leads to high TDS concentrations in wastewater, which lowers the usefulness of the wastewater and increases the cost of recycled water. Refer to *Section 7.7 Recycled Water* for more information about salinity impacts on water recycling. In addition to the link between water supply and water quality, high TDS concentrations in water supplies can damage water delivery systems and home appliances. From 2010 to 2014, the TDS concentrations in Lake Havasu in Arizona and Lake Mathews in Riverside County ranged from 570 to 640 mg/L. These lakes contain 100% Colorado River water. TDS concentrations in Lake Havasu were measured at 662 mg/L in October 2015 and 592 mg/L in October 2019. Salinity in the Colorado River is expected to increase as development increases in the basin.

To reduce the effects of high TDS concentrations on water supply reliability, Metropolitan approved the Salinity Management Policy in April 1999 (Metropolitan, 1999). One of the policy goals is to blend Colorado River supplies with less saline water from the State Water Project to achieve delivered water salinity concentrations of less than 500 mg/L TDS. Since 1976, TDS concentrations in Metropolitan's Colorado River supply have averaged approximately 630 mg/L. In addition, and to foster interstate cooperation on this issue, seven basin states in the nation formed the Colorado River Basin Salinity Control Forum in 1973. To lower TDS concentrations in Colorado River supplies, the Colorado River Basin Salinity Control Forum develops programs designed to prevent a portion of the naturally abundant salt supply from moving into the river system. The Colorado River Basin Salinity Control Program targets the interception and control of non-point sources, such as surface runoff, as well as wastewater and saline hot springs.

Examples of salinity control measures include improved irrigation practices, rangeland management, and the operation of a deep well brine injection project called the Paradox Valley Unit. The Paradox Valley Unit has been a key salinity control project in the Colorado River's Upper Basin, preventing approximately 100,000 tons of salt from entering the river per year since the mid-1990s. With seismic issues in the area and the existing project approaching the end of its useful life, the existing brine injection well paused operation in 2019 and Reclamation is working with the Colorado River Basin States to develop a solution that continues to protect water quality and maintain salinity control. Combined, salinity control projects remove over a million tons of salts from the Colorado River water annually, resulting in reduced salinity concentrations of over 100 mg/L as a long-term average (Metropolitan, 2021).

7.3.2 Perchlorate

Perchlorate was first detected in Colorado River water in June 1997 and was traced to the Las Vegas Wash. The source of contamination was found to be emanating from two chemical manufacturing facilities in Henderson, Nevada (Metropolitan, 2021). The Nevada Division of Environmental Protection manages a comprehensive groundwater remediation program in the Henderson area. The amount of perchlorate loading into the Las Vegas Wash has been reduced from over 1,000 pounds per day prior to treatment to 50-90 pounds per day since early 2007, more than a 90 percent reduction of the perchlorate loading into the Colorado River system. As a result of aggressive cleanup efforts, perchlorate in the Colorado River water at Lake Havasu has decreased significantly from a peak of 9 µg/L in May 1998 to typically less than 2 µg/L since June 2006 (as compared to the California MCL of 6 µg/L).

7.3.3 Uranium

Naturally occurring uranium has always been present in Colorado River water and has also always been under the California MCL of 20 pCi/L at Metropolitan's Colorado River intake. The risks to water quality have primarily come from upstream mining in Moab, Utah, and other potential mining sites in the west. Currently, the U.S. Department of Energy is working to remove and through September 2020, has disposed of approximately 10.9 million tons of mine tailings annually, which will improve groundwater quality on the Colorado River watershed near Moab. Completion of this cleanup is anticipated in Fiscal Year 2034 (U.S Department of Energy, 2020). Current levels at Metropolitan's intake water have ranged from 1 to 6 pCi/L and are well below the MCL. Potential future risks include new mining operations and expansion of nuclear fuel production should they be in proximity to the Colorado River. In January 2012, a 20-year moratorium on new uranium mining claims went into effect. Despite challenges, this moratorium remains in place (Metropolitan, 2021).

7.3.4 Nutrients

The Colorado River system has historically been low in nutrients, but with population growth in the watershed, nutrients are still a concern. Metropolitan is involved with upstream entities along the lower Colorado River to enhance wastewater management to control nutrient

loading, especially phosphorus. The Colorado River's low nutrient level has been important for blending with State Water Project water to reduce the nutrient level delivered to retail water agencies and cities that supply water directly to consumers.

7.3.5 Arsenic

Arsenic is another naturally occurring element monitored by drinking water agencies. Arsenic concentrations in Metropolitan's Colorado River source water have ranged from 2.2 to 2.8 µg/L. Increasing coagulant doses at water treatment plants can reduce arsenic concentrations for retail deliveries.

7.3.6 Chromium-6

Metropolitan has actively monitored Colorado River water for chromium-6. Most monitoring results have been below the detection limit for reporting, but when detected, levels range from 0.03 to 0.085 µg/L (Metropolitan, 2021). Between 1951 and 1985, Pacific Gas & Electric Company used chromium-6 as an anticorrosion agent for cooling towers at a gas compressor station located along the Colorado River near Topock, Arizona (DTSC, 2020). This is a toxic cleanup site. Chromium-6 monitoring results from the Colorado River upstream and downstream of this site have been below the detection limit for reporting.

7.4 State Water Project

The key water quality issues for the State Water Project are DBP precursors, in particular, TOC, bromide, and low alkalinity. Bromide and TOC combine with chemicals used for water treatment, forming DBPs that are regulated under the federal SDWA. Low alkalinity water requires a higher percentage of total organic carbon removal in order to reduce disinfection byproduct formation. Wastewater discharges from cities and towns surrounding the Delta also add salts and pathogens to Delta water, influencing its suitability for drinking and recycling (Metropolitan, 2021).

The 2000 Record of Decision adopted by the CALFED Bay-Delta Program (CALFED) states that CALFED will either achieve water quality targets at Clifton Court Forebay, a State Water Project facility, and drinking water intakes in the south and central Delta, or it will achieve an "equivalent level of public health protection using a cost-effective combination of alternative source waters, source control, and treatment technologies" (CALFED 2000).

Actions to protect Delta fisheries have impacted Delta water quality problems by requiring the State Water Project to shift its diversions from the spring to the fall, when salinity and bromide concentrations are higher. Closure of the Delta Cross-Channel gates to protect migrating fish has also degraded State Water Project water quality by reducing the flow of higher-quality Sacramento River water to the State Water Project pumps at critical times. This can result in increased salinity and bromide concentrations in water delivered to Southern California.

The Delta Plan (Delta Stewardship Council, 2013) includes policies and recommendations to achieve “coequal goals,” which means the two goals of providing more reliable water supply for California *and* protecting, restoring, and enhancing the Delta ecosystem. In 2016, USBR and DWR developed the California WaterFix, a twin-tunnel solution focused on conveyance and ecosystem improvements to significantly reduce reverse flows and fish species impacts associated with the existing south Delta intakes. In 2019, Governor Newsom directed state agencies to proceed with modernizing Delta infrastructure with a single-tunnel project (as part of a water resilience portfolio approach). DWR is currently proposing construction of a new, single-tunnel Delta Conveyance Project with intakes in the north Delta. By moving the intakes upstream, the project intends to improve water quality in the Delta and allow for increased deliveries in wet years. The Delta Conveyance Project is currently envisioned to include two new intakes along the Sacramento River, a tunnel to work as a dual facility with the existing Delta waterway to transfer water to the existing state and federal pumping facilities, and environmental mitigation in compliance with state and federal environmental laws. DWR is preparing the environmental document for the project; a draft is expected in 2022 and a final document is expected in 2023. Project permitting is expected to be complete in 2024. This project will require broad support and funding commitments to implement.

The water quality issues are shown below in order of their magnitude for this supply.

7.4.1 Total Organic Carbon and Bromide

A key water quality issue for the State Water Project is DBPs, particularly from TOC and bromide. TOC and bromide are naturally occurring in water, but concentrations increase several-fold in State Water Project supplies due to agricultural runoff and seawater intrusion as water moves through the Delta. TOC and bromide form DBPs, a water quality concern, when treated with disinfectants such as chlorine. Some DBPs have been identified and are regulated under SDWA; others are not yet identified. Existing levels of bromide and TOC in Delta water supplies may present challenges for water utilities when complying with regulations. Metropolitan has been in compliance with DBP regulations since they became effective.

Treating water to DBP standards is accomplished by different methods:

- The Metropolitan treatment plants serving the San Diego region have upgraded to the use of ozone as a primary disinfectant to treat challenging water sources, such as State Water Project supply, and they continue to meet DBP standards.
- Some local treatment plants use chlorine dioxide as a primary disinfectant to reduce DBP formation.
- Blending of State Water Project source water with Colorado River water also reduces precursors and DBP formation.

7.4.2 Nutrients

State Water Project supplies have significantly higher nutrient levels than Colorado River supplies. Elevated levels of nutrients can increase nuisance algal and aquatic weed growth,

affecting taste and odor in product water and potentially reducing filter run times at WTPs. Nutrient-rich soils in the Delta, agricultural runoff, and wastewater discharges are primary sources of nutrient loading in the State Water Project water supply. Water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. Sacramento Regional County Sanitation District, the primary wastewater discharger to the Sacramento River, launched treatment plant upgrades in 2015 to comply with its 2010 discharge requirements for ammonia and nitrate removal. Completion of upgrades is expected by 2023. In 2014, the City of Stockton Wastewater Treatment Plant, a significant discharger to the San Joaquin River, was issued waste discharge requirements with more stringent nitrogen limits. This plant is undergoing upgrades that are expected to be complete by 2024.

During drought, low flows, increased temperatures, and increased nutrient concentrations can increase algal blooms, which then produce algal toxins. Of particular concern is microcystins, a harmful species of cyanobacteria. DWR increases application of copper compounds to control algae and aquatic weed growth during drought. Consumer taste and odor complaints due to Delta nutrients depend on the blend of imported water delivered through Metropolitan. Metropolitan developed a comprehensive program to monitor and manage algae in its source water reservoirs and to provide early warning of algae-related problems, taste, and odor events. This is an area where increased monitoring, response and oversight, and proactive management of reservoir water quality will ensure a safe water supply. Although current nutrient loading is a concern with potential cost implications, there should be no impact on availability of water supplies to Metropolitan given its monitoring program and response actions. Metropolitan's source water protection program will continue to focus on preventing future increases in nutrient loading resulting from urban and agricultural sources.

7.4.3 Salinity

Water supplies from the State Water Project have significantly lower TDS concentrations than the Colorado River, averaging 250 mg/L in water supplied through the East Branch and 325 mg/L through the West Branch. Because of this lower salinity, Metropolitan blends State Water Project water with high-salinity CRA water to reduce salinity in delivered water. However, both supply and TDS concentrations in State Water Project water can vary significantly in response to hydrologic conditions in the Sacramento–San Joaquin watersheds. Potential salinity intrusion in the Delta due to sea-level rise as a result of climate change could also present a risk for increased TDS concentrations in State Water Project supplies.

TDS concentrations in State Water Project water can also vary widely over short periods of time. These variations reflect seasonal and tidal flow patterns, and they pose an additional problem for blending as a management tool to lower TDS concentrations in CRA supply. For example, during the 1977 drought, the salinity of State Water Project water reaching Metropolitan increased to 430 mg/L, and supplies became limited. During this same event, water salinity at Metropolitan's Harvey O. Banks Pumping Plant exceeded 700 mg/L. Under

similar circumstances, Metropolitan's 500 mg/L salinity objectives could only be achieved by reducing imported water from the CRA. Thus, it may not be possible to maintain both salinity standards and water supply reliability unless salinity levels of source supplies can be reduced.

TDS objectives are included in Article 19 of the SWP Water Service Contract, which specifies a ten-year average of 220 mg/L and a maximum monthly average of 440 mg/L. Because these objectives have not yet been met, the State, Metropolitan, and other agencies are coordinating to implement programs aimed at reducing salinity in Delta supplies. These programs include modification of agricultural drainage and development of comprehensive basin plans. Gates and channel barriers have also been placed in strategic locations in the Delta to reduce salt transportation from seawater. In May 2015, a temporary rock barrier was installed in False River to help limit salt intrusion from the San Francisco Bay into the central Delta during the recent drought emergency. The Delta Conveyance Project is designed to reduce salinity in State Water Project supplies by diverting a greater percentage of flows from the lower salinity Sacramento River (Metropolitan, 2021).

7.4.4 Arsenic

Between 2010 and 2020, arsenic concentrations in State Water Project water have ranged from non-detect to 4.8 µg/L. Increasing coagulant doses at WTPs can reduce arsenic levels for retail deliveries. Some of Metropolitan's State Water Project groundwater storage programs appear to be vulnerable to arsenic contamination; as a result, Metropolitan has had to restrict flow from one program to limit arsenic increases in the State Water Project and an arsenic treatment facility was developed by one of Metropolitan's groundwater partners, which has increased groundwater supply costs. Non-project deliveries of groundwater to the California Aqueduct increase during drought periods. Although groundwater being pumped into the aqueduct contains arsenic in concentrations above the MCL, arsenic in blended water remains below the MCL. The intent of the blending is to manage inflows so that the arsenic concentrations do not exceed 10.0 µg/L. Arsenic levels in Metropolitan's water treatment plant effluents ranged from non-detect to 3.3 µg/L between 2010 and June 2020 (Metropolitan, 2021).

7.4.5 1, 2, 3-Trichloropropane

TCP is a humanmade carcinogenic chemical that has contaminated groundwater throughout the state, primarily in the Central Valley. In December 2017, the SWRCB established an MCL of 0.005 µg/L. There have been no TCP detections in Metropolitan's source water, but some of Metropolitan's groundwater storage programs in the Central Valley that can move water into the State Water Project's California Aqueduct have been affected. After detection of TCP above the MCL in groundwater wells of the Arvin-Edison Water Storage District, Metropolitan has temporarily suspended operation of this program until water quality concerns can be further evaluated and managed. The levels of TCP detected in Metropolitan's other Central Valley groundwater storage programs are much lower and impact fewer groundwater wells.

Metropolitan is evaluating the effects of TCP on the return capability of those programs (Metropolitan, 2021).

7.5 Local Surface Water Reservoirs

Local surface water supply reservoirs are used to store imported water from the State Water Project and Colorado River, and to capture local watershed runoff from the watershed. Planning is also underway by the Water Authority's member agencies for several local reservoirs to support potable reuse through reservoir augmentation (refer to *Section 5.5 Potable Reuse Supply* for more information).

The San Diego region's water quality is influenced by a variety of factors depending on source. As stated above, waters from the Colorado River and Northern California are vulnerable to a number of contributors to water quality degradation. Regional surface water and groundwater quality is vulnerable to increasing urbanization in the watershed, agriculture, recreational uses, invasive species, and fires. Historically, regional surface water quality has been considered good to excellent. Water quality can vary with imported water inflows and surface water contamination. While many local surface water supplies remain good quality, some local supplies are lower quality; poor quality water results in higher treatment costs and challenges to downstream utilities, who must reliably treat water to meet drinking water standards. Downstream treatment plants are designed to remove and inactivate pathogens through filtration and disinfection.

Source water protection is considered a key element to regional water quality. The Water Authority and its member agencies work together to improve watershed awareness and management. Currently, the most significant water quality issue that affects the public is algae blooms, which can create taste and odor problems, or generate algal toxins. Algae blooms are typically caused by runoff containing nutrients and build-up of those nutrients in local reservoirs. San Diego region water suppliers are actively developing monitoring and response plans to assure that water delivered to the public is safe for human consumption.

In the County, DDW has primacy over the implementation of the SDWA. The SDWA regulates source water protection to ensure public health through the multiple barrier approach to source protection and treatment, an approach that anticipates that the public will participate in source water protection. Member agencies in the Water Authority's service area that have surface water sources have a good, long-standing working relationship with DDW.

A similar requirement from USEPA calls for utilities to complete an annual source water assessment. Information collected in source water assessments is used to evaluate changes in potential sources of contamination and to help determine if more protection measures are needed. USEPA also requires utilities to complete a source water assessment that uses information collected in sanitary surveys. A source water assessment is also used to evaluate the vulnerability of water sources to contamination and helps determine whether more protective measures are needed.

Source water protection is fundamentally important to all of California. DDW requires large utilities delivering surface water to complete a watershed sanitary survey every five years to examine possible sources of drinking water contamination. The watershed sanitary survey shall include suggestions for how to protect water quality at the source.

Monitoring key constituents in source water is critical for identifying constituents that should be controlled at the source and to determine the best ways to operate a water system to improve the quality of water delivered to the consumer. The effect of urban and agricultural runoff on receiving water quality is a statewide and nationally recognized problem. Water Authority staff works with its member agencies on reservoir water quality issues through its member agency monthly operating heads meetings and the member agency reservoir workgroup, which meets on an as-needed basis to discuss regulatory and policy issues.

The San Diego RWQCB has regulatory authority to protect local water supplies from impacts caused by pollutants in runoff. The San Diego RWQCB's 2013 *Practical Vision* prioritizes achieving a sustainable local water supply (San Diego RWQCB, 2013). Water Authority staff is advocating to increase protection of drinking water supplies through reasonable and practical methods. For example, Water Authority staff served on the consultation committee for the *San Dieguito Water Quality Improvement Plan Update* (Project Clean Water, 2020). This update, which is required by the San Diego RWQCB under the Municipal Separate Storm Sewer System (MS4) permit, was developed in fiscal year 2021 by the cities of San Diego, Del Mar, Escondido, Poway and Solana Beach, and the County. The *San Dieguito Water Quality Improvement Plan* prioritized protection of nutrient water quality at Hodges Reservoir.

To address issues associated with surface water quality and watershed management, the Water Authority, the City of San Diego, and the County have formed a Regional Water Management Group to coordinate development of an IRWM Program for the San Diego region. An important element of the IRWM Program is to protect and enhance the region's local surface water quality. As part of this process, watershed-based and reservoir projects were identified and are being implemented to protect and improve the watershed and surface water quality.

One key objective of the IRWM Program is to reduce sources of pollutants and environmental stressors. This objective targets water management strategies that directly address pollution management and include agricultural land stewardship, pollution prevention, urban land use planning, urban runoff management, and watershed management and planning. The IRWM Program stresses the need to attain the San Diego region's water quality standards by managing runoff from all sources within the region through the watershed management framework (refer to *Section 8 Integrated Regional Water Management Planning* for more information).

DWR has provided funding for projects through the San Diego IRWM Program to improve water quality in several of the watersheds with local water supply reservoirs. IRWM Program grants have funded several projects in the San Dieguito watershed for the improvement of water

quality in Hodges Reservoir, which is impacted by urban and agricultural runoff. The IRWM-funded projects completed assessed water quality in the reservoir and impacts from urban and agricultural runoff and developed projects to help solve the water quality challenges. For example, IRWM Program grants are funding a hypolimnetic aeration system in Hodges Reservoir and funded construction of wetlands that will capture and treat urban runoff.

7.6 Groundwater

The water quality parameters that can affect reliability of groundwater resources in the San Diego region are salinity, nutrients, iron and manganese, methyl tertiary butyl ether, and PFAS. The Water Boards issue permits for activities that may impact groundwater quality based on the type of discharge and threat to water quality. Permitted programs include irrigated agricultural lands, land disposal, and septic systems. Groundwater is also regulated under SGMA, which requires medium- and high-priority groundwater basins to develop GSPs and manage groundwater for long-term sustainability.

7.6.1 Salinity

Increased TDS concentrations in groundwater basins occur either when basins near the ocean are overdrafted, which leads to seawater intrusion, or when agricultural and urban return flows add salts to a basin. Much of the water used for agricultural or urban irrigation infiltrates into a basin's aquifer, so where high-TDS irrigation water is used or where the water transports salts from overlying soil, infiltrating water will increase aquifer salinity. Using groundwater with high salinity requires demineralization through reverse osmosis. When compared to other water supplies, desalinated groundwater has proven to be a cost-effective and reliable supply (refer to *Section 5.3 Groundwater* for more information about groundwater recovery projects). Increased nitrate concentrations can occur in groundwater due to runoff and recharge from agriculture and from onsite waste treatment systems. High-nitrate concentrations can be managed through treatment or blending with other lower nitrate sources.

To protect water quality in these basins, the San Diego RWQCB often places restrictions on the salinity and nitrate concentrations of water used for basin recharge or for irrigation of lands overlying the aquifers. Where these restrictions are in place, water reuse and aquifer recharge may be restricted, or expensive mitigation measures may be required. The San Diego RWQCB also includes criteria in their *Basin Plan* for permitting onsite waste treatment systems and regulates agricultural discharges (San Diego RWQCB, 1994).

7.6.2 Nutrients

Nutrients, specifically nitrates, can also be deposited into groundwater through urban and agricultural runoff. Salt and nutrient management planning is also required under the state's *Recycled Water Policy* to address potential impacts to quality of groundwater basins (SWRCB, 2018). Water Boards have regulatory authority to require recycled water project proponents to

develop salt and nutrient management plans. The most effective management will include participation from stakeholders basinwide, which the policy encourages but does not require.

7.6.3 Iron and Manganese

Some local groundwater supplies are naturally high in iron and manganese. While not a public health concern, groundwater supplies exceeding the secondary standard for iron and manganese are treated to remove these constituents.

7.6.4 Per- and Poly-Fluoroalkyl Substances (PFAS)

PFAS are a CEC that has the potential to impact groundwater quality. Starting in early 2019, the SWRCB began an investigative study to better understand the extent of PFAS contamination across the state, discussed in more detail in *Section 7.2.9 Constituents of Emerging Concern* (SWRCB, 2020b). Detection of PFAS has been found in limited groundwater basins in San Diego County. If PFAS are found in groundwater at levels of potential concern for drinking water, it may be addressed through treatment such as reverse osmosis, changing blending rates, or by removing individual wells from service.

7.6.5 Water Quality of High and Medium Priority Basins

SGMA requires local agencies to adopt GSPs for high- and medium-priority groundwater basins and reach long-term sustainability. The three SGMA-mandated basins in San Diego County are defined by DWR's *Bulletin 118 Interim Update 2016, California's Groundwater—Working Toward Sustainability* (DWR 2016):

- San Luis Rey Valley Basin, a medium-priority basin located in the Water Authority service area
- San Pasqual Valley Basin, a medium-priority basin located in the Water Authority service area
- Borrego Valley Basin, a high-priority basin located outside of the Water Authority service area

Ensuring basin sustainable yield can help prevent water quality degradation (for more information on SGMA see *Section 5.3.3 Sustainable Groundwater Management Act*).

7.7 Recycled Water

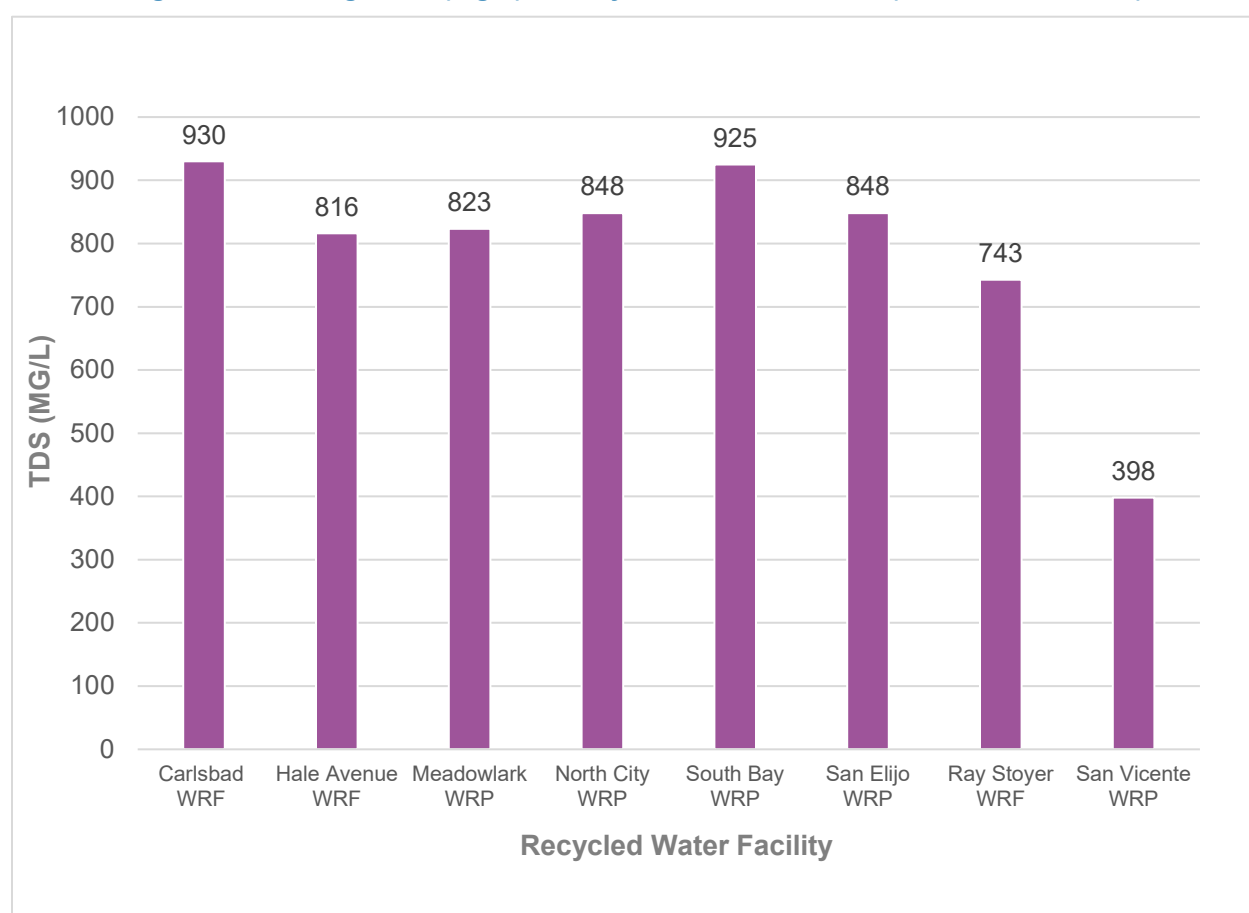
Water quality, specifically salinity, is a significant implementation issue for recycled water projects.

7.7.1 Salinity

High concentrations of TDS in source water pose a special problem for water recycling facilities because conventional treatment processes are designed to remove suspended particles, not dissolved particles. TDS removal, or demineralization, requires an advanced treatment process, which can increase project costs significantly.

Residential use of water typically adds 200 to 300 mg/L of TDS to the wastewater stream. Self-regenerating water softeners can add another pound of salt per day per unit. Infiltration of brackish groundwater into sewer lines can also cause an increase in TDS. If an area receives a water supply with TDS concentrations of more than 700 mg/L, and residents add 300 mg/L or more through normal use, a recycling facility will produce recycled water with a TDS concentration of 1,000 mg/L or higher. Figure 7-1 shows the average TDS concentrations at several existing water recycling facilities. In general, TDS concentrations over 1,000 mg/L become problematic for irrigation and industrial reuse customers. This problem limits the potential uses and marketability of recycled water, particularly for agricultural purposes, as certain crops and nursery stock are sensitive to irrigation water with TDS concentrations exceeding 1,000 mg/L.

Figure 7-1. Average TDS (mg/L) at Recycled Water Facilities (CY 2010 – CY 2019)



The State's *Recycled Water Policy* requires developing basin-specific salt and nutrient management plans to address potential groundwater quality impacts from salts and nutrients in recycled water (SWRCB, 2018). The *Recycled Water Policy* encourages stakeholders basinwide to engage in the development of plans for the most effective management of salt and nutrients, as opposed to imposing requirements solely on individual recycled water projects or other individual sources of salts and nutrients. Several agencies have developed or

are in the process of developing or updating SNMPs in the San Diego region (refer to Section 5.4.3 *Encouraging Recycled Water Development* for more information on SNMPs for recycled water).

Lower-TDS supplies such as brackish groundwater desalination, seawater desalination, and potable reuse will further reduce salt loading to the groundwater basins over time. The lower-TDS source water will also reduce TDS concentrations in recycled water and decrease the need for desalination of recycled water.

7.8 Seawater Desalination

The Pacific Ocean is the feedwater source for the Carlsbad Desalination Plant. By nature of this source, salinity is the key water quality constituent in desalination supplies.

7.8.1 Salinity

From July 2019 to June 2020, feedwater salinity for the Carlsbad Desalination Plant had a TDS concentration average of approximately 37,000 mg/L and ranged from 25,000 to 44,000 mg/L. To address TDS concentrations at these high levels, the desalination facility uses a reverse osmosis membrane treatment process to reduce TDS to less than 350 mg/L (i.e., an average of about 200 mg/L from July 2019 to June 2020), resulting in approximately 99% removal of TDS and a water supply that meets drinking water standards. Desalinated water from the Carlsbad Desalination Plant is blended with other Water Authority treated water supplies at the Twin Oaks Valley WTP. TDS concentration in the blend water will vary seasonally depending on imported water blends from Metropolitan (i.e., the blended percent of State Water Project vs. CRA water). Only one member agency, Vallecitos Water District, has a connection directly to the Carlsbad Desalination Plant pipeline delivering completely desalinated seawater, 100%. Most other agencies who purchase treated water from the Water Authority can receive some percentage of desalinated water with the exception of connections north of the Valley Center Pipeline on the First Aqueduct and connections north of the Metropolitan connection point on the Second Aqueduct. The blend of desalinated water depends on system operations and water demands, and can vary throughout the day, month, or seasonally.

Prior to the reverse osmosis process, feedwater from the Pacific Ocean is pretreated to remove suspended solids, including organic material. The reverse osmosis process then removes dissolved solids. Next, product water is post-treated to prevent corrosion in the distribution system and improve the aesthetic quality of the water. This process generally involves adding alkalinity to the treated water. The final step, a disinfection process, provides a disinfection residual in the treated water.

A single-pass reverse osmosis process of seawater generally results in about 50% recovery of treated water. The remaining 50% is discharged as concentrate, with about twice the salinity of the original feedwater. The concentrate is diluted to avoid negative impacts to the marine environment from the elevated salinity levels prior to discharge.

An important research effort to evaluate the integration of the desalinated water supply in the Water Authority's system, member agencies' distribution systems, and the San Diego region is underway. This research builds on the Water Research Foundation's 2018 "Carlsbad Desalinated Seawater Integration Study," that evaluated water quality in the Water Authority's system and member agency's distribution from 2014 to 2016. The current research is focused on gathering water quality data from 2017 to 2019 under differing blend water conditions and expanding research to evaluate regional salinity reduction and economic impacts associated with salinity reduction from desalinated water.

7.9 Potable Reuse

Several Water Authority member agencies are developing or considering potable reuse projects. Because raw water comes from wastewater treatment plants, a high level of treatment is required to ensure the safety of the water supply.

Wastewater contains pathogens, known chemical contaminants that have an adopted MCL, and CECs. It also contains TOC that could lead to the formation of DBPs if not properly managed. To ensure public health protection, potable reuse projects rely on source control programs, multiple treatment barriers, and monitoring to ensure reliable removal of pathogens and chemical constituents from the water supply. Advanced treatment provides a significant barrier to pathogens and CECs that are likely present in wastewater. Advanced treated water could also be further treated at a downstream surface water treatment plant that provides a significant pathogen barrier.

Advanced treated water will be different in quality from raw water currently supplied to local surface water treatment plants from the Colorado River, State Water Project, and local supplies. Advanced treatment will result in delivery of a water supply to customers with lower TDS concentrations than existing water supplies. Local surface water treatment plant operations need to plan and adapt to changes in water quality associated with this source.

7.9.1 CECs

Reverse osmosis and advanced oxidation are common advanced treatment processes used for potable reuse projects. Advanced treatment provides a significant barrier to pathogens and CECs that are likely present in wastewater. CECs may be concentrated in the brine waste stream which must be properly managed to prevent potential impacts to aquatic life from discharge to surface water. Monitoring for CECs in recycled water and potable reuse is required by the SWRCB. The SWRCB establishes its requirements based on recommendations from science experts with input from various stakeholders including water and wastewater agencies. Through funding provided by the SWRCB, the Southern California Coastal Water Research Project reconvened the 2010 Science Advisory Panel for Recycled Water. The panel released its final report in April 2018 that contains updated recommendations for CEC monitoring including a screening framework for potable reuse that incorporates bioanalytical tools known as bioassays. The SWRCB incorporated these recommendations as requirements in its 2018

amendment to the state's Recycled Water Policy. To assist agencies in complying with the new bioanalytical monitoring requirements, WaterReuse California and National Water Research Institute released in January 2020 a guidance document for agencies to use in developing standard operating procedures for these new bioanalytical tools for potable reuse.

For more information on potable reuse, refer to *Section 5.5 Potable Reuse Supply*.

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SECTION 8 INTEGRATED REGIONAL WATER MANAGEMENT PLANNING

8.1 Introduction

Integrated Regional Water Management (IRWM) planning involves coordinating and integrating water planning activities in a defined region to improve and maintain a region's water supply reliability and water quality. IRWM planning recognizes that water supplies, water quality and natural resources are connected, and as such, focuses on projects that produce multiple benefits in those areas. IRWM planning typically involves both governmental and non-governmental stakeholders.

IRWM planning also is a mechanism through which a region becomes eligible for state grant funding for projects that help to achieve goals established through IRWM planning efforts. Through three voter-approved bond measures -- Proposition 50 in 2002, Proposition 84 in 2006 and Proposition 1 in 2014 -- DWR has awarded approximately \$2 billion to support IRWM planning and implementation in the 48 recognized IRWM planning regions in California.

IRWM has been a featured element of the last four *California Water Plan* updates (DWR, 2019). The *California Water Plan Update 2018* recommends "strengthen(ing) state support for integrated regional water management."

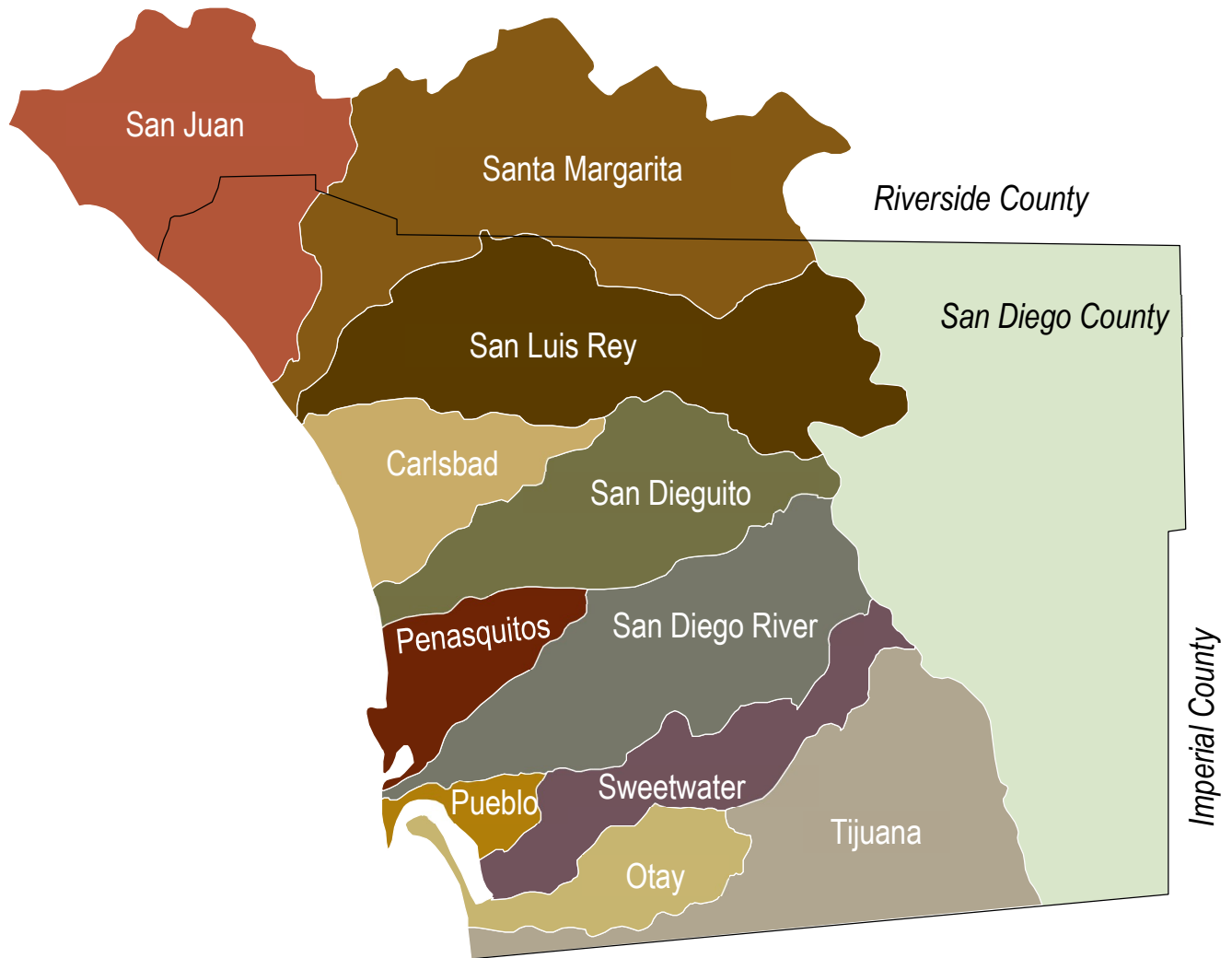
8.2 Background and Working Groups

In 2005, the Water Authority, the City of San Diego, and the County joined to form the Regional Water Management Group (RWMG). The RWMG defined the San Diego IRWM planning region as the County watersheds that are tributary to coastal waters (Figure 8-1). The RWMG in turn organized the Regional Advisory Committee (RAC) to help complete San Diego's first *San Diego Integrated Regional Water Management Plan* (IRWM Plan), which was published in 2007 (City of San Diego, County of San Diego, and Water Authority, 2007).

The RAC also advises the RWMG on important matters such as selection of projects for funding applications. From 2011 to 2013 and 2017 to 2019, the RWMG and the RAC worked together to update regional information and priorities in the 2013 IRWM Plan (City of San Diego, County of San Diego, and Water Authority, 2013) and 2019 IRWM Plan (City of San Diego, County of San Diego, and Water Authority, 2019).

Additionally, the RAC provides diverse representation to the IRWM Program from various functional areas related to water management, including water supply, water quality, wastewater, natural resources, watersheds, stormwater, disadvantaged communities, flood management, business, agriculture, tribes and land use planning.

Figure 8-1. San Diego Integrated Regional Water Management Planning Region



8.3 Integrated Regional Water Management Plan and Updates

The original 2007 IRWM Plan and updates, which were published in 2013 and 2019, were adopted by the Water Authority Board of Directors, San Diego City Council, and San Diego County Board of Supervisors. The San Diego IRWM Plan forms the foundation of long-term IRWM planning in the region and is required for the San Diego planning region to be eligible to receive state funding.

The 2019 IRWM Plan established the following five goals for the San Diego IRWM Program:

- Improve the reliability and sustainability of regional water supplies
- Protect and enhance water quality
- Protect and enhance our watersheds and natural resources
- Enhance resiliency to climate change for local water resources
- Promote and support sustainable integrated water resource management

The 2019 IRWM Plan also presents 10 regional objectives and associated metrics. For detailed information about the San Diego IRWM Plan, refer to <https://sdirwmp.org/irwm-planning>.

8.4 Grants and Funding

Since 2008, DWR has awarded nine IRWM grants totaling \$111.7 million to the San Diego IRWM planning region (Table 8-1).

Table 8-1. IRWM Grant Awards to San Diego Region

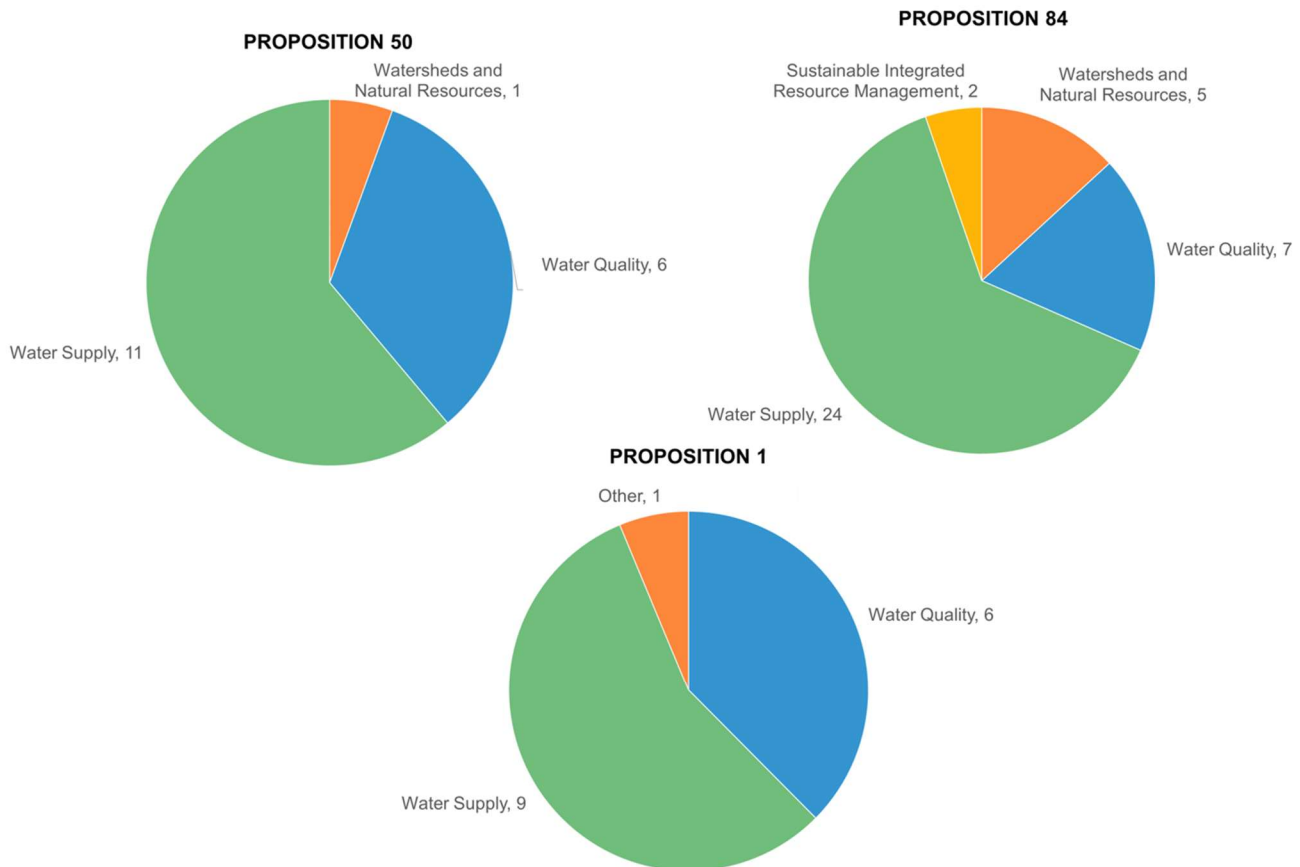
Funding Source	Date Awarded	Grant Award (\$ millions)	Projects Funded	Projects Completed	Grant Billed to DWR (\$ millions)
Proposition 50	2008 - Completed	25	18	18	24.9
Proposition 84, Plan Update	2011 - Completed	1	1	1	1
Proposition 84, Round 1	2011 - Completed	7.9	11	11	7.9
Proposition 84, Round 2	2014	10.5	7	6	10.5
Proposition 84, Round 3	2014	15	7	3	12
Proposition 84, Round 4	2016	31	13	1	7.4
Proposition 1, Plan Update	2017	.25	1	1	.25
Proposition 1, Disadvantaged Community Involvement Program	2017	5.6	9	2	4.2
Proposition 1, Round 1	2020	15.3	7	0	0
Total		111.7	74	43	68.3

Notes: Data shown here as of July 9, 2020.

Combined, these grants have supported 74 multi-benefit projects developed by public agencies and non-profit organizations (Figure 8-2). A total of \$69.5 million of the funding has been directed to 10 projects sponsored by the Water Authority and 30 projects sponsored by Water Authority member agencies.

The Water Authority has an additional role in the San Diego IRWM Program. The MOU that established the San Diego RWMG designates the Water Authority as the lead agency for purposes of applying for grants, signing grant agreements, administering grant funding, and representing the RWMG to funding agencies. The Water Authority administers the grant funds for all individual projects with respect to reporting progress, submitting invoices to DWR, and distributing funding to project sponsors. This responsibility requires the Water Authority to contract directly with all project sponsors except for projects sponsored by the Water Authority itself. To defray these administrative costs, the Water Authority receives up to 6% of IRWM Program grant funds awarded to the region.

Figure 8-2. San Diego Integrated Regional Water Management Implementation Grant Projects Per Primary Benefits



The San Diego IRWM Program supports the UWMP by promoting regional planning and funding projects that aim to increase water supply reliability and improve surface water and groundwater quality. IRWM planning and funding help establish water supply projects in the areas of seawater desalination, recycled water, potable reuse, local surface water and groundwater, all of which are identified in this 2020 UWMP as part of the San Diego region's projected mix of water resources. The IRWM Program also supports water conservation, which is another key element of this 2020 UWMP. Figure 8-3 illustrates three projects funded through the IRWM Program.

Figure 8-3. Examples of IRWM Projects



The Water Authority has installed a demonstration garden on its property showcasing water-wise plants, water capture techniques, and on-site treatment features (e.g., bioswales).



The Richard A. Reynolds Groundwater Desalination facility, owned and operated by Sweetwater Authority, treats brackish groundwater from the San Diego Formation to serve customers in both Sweetwater Authority's and City of San Diego's service areas.



The Hodges Reservoir Hypolimnetic Oxygenation System, or Speece Cone, was installed to oxygenate water at the bottom of Hodges Reservoir to support improved water quality in the reservoir. This will allow for reduced treatment cost of water from the reservoir, as well as expand the uses of water stored in Hodges Reservoir.

8.5 References

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SECTION 9.0 WATER SUPPLY RELIABILITY

9.1 Introduction

As required by the UWMP Act, every UWMP must include an assessment of water supply reliability. The assessment must compare total projected water supply and demands over the next 20 years in five-year increments under normal, single dry water years, and multiple dry water years. For this 2020 UWMP, the assessment evaluates reliability through the next 25 years. Verifiable supplies are those included in water supply assessments, along with verifications prepared by retail water agencies. This supply information is used by the County and cities in the San Diego region when making project-based land use decisions regarding available water supplies for growth per the requirements of Senate Bill 221 and Senate Bill 610. Projects with adequate documentation regarding implementation and supply use, or existing projects already planned for expansion, are included in the assessments discussed in Sections 9.3 and 9.4 below.

This section includes information about water demands and supplies in the Water Authority's service area and summarizes the Water Authority reliability assessment. Reliability assessment results demonstrate that, even when making conservative assumptions about the availability of dry year supplies from Metropolitan, the San Diego region's water resource mix is drought resilient. Section 9 also includes the Water Authority's Drought Risk Assessment.

9.2 Development of Projected Water Resources Mix

Development of the Water Authority's projected mix of water resources to meet future demand is based on the following factors:

- Member agency projected water recycling, potable reuse, groundwater, desalination, and surface water supplies (*Section 5 Member Agency Supplies*)
- Continued regional water use efficiency (*Section 3 Demand Management*)
- Previous Board approvals made in regard to Water Authority supplies (*Section 4 Water Authority Supplies* and *Section 11 Water Shortage and Drought Planning*), as follows:
 - Agreement between Imperial Irrigation District and the Water Authority for transfer of conserved water, and other related agreements (*Section 4.2 Water Authority-Imperial Irrigation District Water Conservation and Transfer Agreement*)
 - Agreements related to the ACC and CC Lining Projects, and other related agreements (*Section 4.3 All-American Canal and Coachella Canal Lining Projects*)
 - Carlsbad Desalination Plant Water Purchase Agreement between the Water Authority and Poseidon Water (*Section 4.5 Carlsbad Desalination Plant*)
 - Acceptance of San Vicente Dam Raise Project (i.e., emergency and carryover storage) as complete (*Section 11.4.1 Water Authority Carryover Storage Program*)

- Approval of *2013 Regional Water Facilities Optimization and Master Plan Update* (Water Authority 2013) (*Section 1.6.4 Capital Improvement Program*)
- Agreements and actions related to out-of-region groundwater banking programs (*Section 11.4.3 Water Authority's Out-of-Region Groundwater Program*)

9.3 Normal Water Year Assessment

Table 9-1 shows a normal water year assessment, summarizing total water demands in the Water Authority's service area through 2045, along with the supplies necessary to meet demand under normal conditions. *Section 2.4 Projected Water Demands* of this 2020 UWMP forecasts normal year water demands in the Water Authority's service area. Based on Table 9-1, no shortages are anticipated in the Water Authority's service area during a normal water year through 2045.

For the reliability assessment, projected supplies from Metropolitan were considered supplemental and calculated as the increment of supply necessary to meet demands after taking into account member agency and Water Authority supplies. Metropolitan staff provided the Water Authority with estimated demands on Metropolitan that will be used in their 2020 UWMP. Metropolitan's estimated demands are adequate to cover the Water Authority's supplemental supply need identified in Table 9-1. Metropolitan's estimated demand data are included in *Appendix G, Water Authority Demands Provided by Metropolitan*. Demands on Metropolitan shown in Appendix G include the Water Authority's QSA supplies delivered under a water Exchange Agreement with Metropolitan, as discussed in Section 4.2.3.

Table 9-1. Normal Water Year Supply and Demand Assessment (AF/YR) ^a

	2025	2030	2035	2040	2045
Water Authority Supplies					
Imperial Irrigation District Water Transfer	200,000	200,000	200,000	200,000	200,000
ACC and CC Lining Projects	78,700	78,700	78,700	78,700	78,700
Carlsbad Desalination Plant	50,000	50,000	50,000	50,000	50,000
Subtotal	328,700	328,700	328,700	328,700	328,700
Member Agency Supplies (Verifiable)					
Surface Water	43,957	43,957	44,659	44,659	44,659
Water Recycling	42,993	46,493	46,593	46,693	46,793
Seawater Desalination	6,000	6,000	6,000	6,000	6,000
Potable Reuse	33,042	53,202	112,562	112,562	112,562
Brackish Groundwater Recovery	8,400	8,400	8,400	8,400	8,400
Groundwater	21,900	23,100	23,100	19,600	19,600
San Luis Rey Water Transfers	15,800	15,800	15,800	15,800	15,800
Subtotal	172,092	196,952	257,114	253,714	253,814
Metropolitan Water District Supplies	54,966	52,592	12,660	31,821	48,257
Total Projected Supplies	555,758	578,244	598,474	614,235	630,771
Total Long-Range Demand Forecast with Conservation	555,758	578,244	598,474	614,235	630,771

^a Normal water year demands based on 1960–2018 hydrology. See Section 2 Water Demands.

9.4 Dry Water Year Assessment

The UWMP Act also requires a water supply reliability assessment to compare supply and demand under single dry water years and multiple dry water years over the next 20 years, in five-year increments. *Section 2.4.3 Projected Dry-Year Water Demands* describes the derivation of the dry-year demands.

9.4.1 Single Dry-Year Assessment

Table 9-2 shows the single dry-year assessment. The projected dry-year demands reflect long-term water use efficiency, but do not incorporate potential savings due to extraordinary conservation occurring during droughts. This approach allows for more comprehensive shortage analyses and drought response planning.

The projected groundwater and surface water yields shown in Table 9-2 are based on 2015 dry-year supplies. Member agency projected verifiable supplies for recycling, potable reuse, seawater desalination, brackish groundwater recovery, and San Luis Rey water transfers are assumed to experience little, if any, reduction in a dry year. Water Authority conserved supplies from the Imperial Irrigation District transfer, canal lining projects, and Carlsbad Desalination

Plant are also considered drought-resilient as discussed in *Section 4 Water Authority Supplies*. For this single dry-year assessment, it was assumed that Metropolitan supplies are limited to 1.3 million AF due to dry conditions and additional reduction in Metropolitan’s deliveries from State Water Project (i.e., no Delta improvements) and Colorado River, and that the Water Authority received its preferential right based on Metropolitan’s current method of calculating such rights.

With a conservative assumption regarding limited Metropolitan supplies during a single dry-year, Water Authority and member agency supplies maintained and developed as planned, and achievement of the additional conservation target, no shortages are anticipated in the Water Authority’s service area under a projected single dry-year.

Table 9-2. Single Dry-Year Supply and Demand Assessment in Five Year Increments (AF/YR)

	2025	2030	2035	2040	2045
Water Authority Supplies					
Imperial Irrigation District Water Transfer	200,000	200,000	200,000	200,000	200,000
ACC and CC Lining Projects	78,700	78,700	78,700	78,700	78,700
Regional Seawater Desalination	50,000	50,000	50,000	50,000	50,000
Subtotal	328,700	328,700	328,700	328,700	328,700
Member Agency Supplies ^a					
Surface Water	6,004	6,004	6,004	6,004	6,004
Water Recycling	42,993	46,493	46,593	46,693	46,793
Seawater Desalination	6,000	6,000	6,000	6,000	6,000
Potable Reuse	33,042	53,202	112,562	112,562	112,562
Brackish GW Recovery	8,400	8,400	8,400	8,400	8,400
Groundwater	15,281	15,281	15,281	15,281	15,281
San Luis Rey Water Transfers	15,800	15,800	15,800	15,800	15,800
Subtotal	127,520	151,180	210,640	210,740	210,840
Metropolitan Water District Supplies	336,232	336,674	337,116	337,558	338,000
Total Single Dry-Year Demands with Conservation	792,452	816,554	876,456	876,998	877,540
Total Demands with Water Efficiency Savings	596,965	618,879	639,310	655,054	671,320
Potential Supply (Shortage) or Surplus	195,487	197,675	237,146	221,944	206,220
Use of Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	792,452	816,554	876,456	876,998	877,540
Remaining Potential Surplus Supply, or (Shortage) that will be addressed through Management Actions	195,487	197,675	237,146	221,944	206,220

^a Member agency local supplies include production from verifiable reliable sources, as well as dry-year totals for actual 2015 surface water and groundwater supplies.

9.4.2 Multiple Dry-Year Assessment

In accordance with the UWMP Act, Table 9-3 through Table 9-7 below show the required multiple dry-year assessments in five-year increments. Under this scenario, seawater desalination and San Luis Rey water transfer supplies are based on contractual levels; recycling, brackish groundwater recovery, and potable reuse yields are based on member agency projected growth in these verifiable supplies; and surface and groundwater yields are based on 2011-2015 water use levels.

During the multiple dry-year reliability analysis, it was conservatively assumed that Metropolitan would allocate supplies to its member agencies. By assuming allocations in the reliability assessment, the Water Authority evaluates if draws from regional storage supplies are required and any likelihood of shortages. Currently, Metropolitan allocates supplies through its *Water Supply Allocation Plan* (Metropolitan, 2014). Because it is uncertain how Metropolitan will allocate supplies to its member agencies in the future, the analysis assumes supplies are allocated based on preferential right to Metropolitan supplies. As discussed in *Section 6.1.1 Metropolitan Act Section 135 – Preferential Right to Water*, Metropolitan Act Section 135 allows a Metropolitan member agency to acquire, for use within the agency, supplies based on preferential right at any time.

The Water Authority's annual preferential right percentage of Metropolitan supplies shown in Table 9-3 through Table 9-7 is estimated through 2045. A conservative analysis methodology was used given the numerous uncertainties associated with identifying Metropolitan's future available supplies and storage. The analysis assumes total annual Metropolitan dry-year supplies available for allocation to be 1.3 million AF for the first year, and 1.2 million AF for the remaining four years.

Table 9-3. 2021–2025 Multiple Dry Water Year Supply and Demand Assessment (AF/YR)

	2021	2022	2023	2024	2025
Member Agency Supplies ^a	153,762	152,645	132,982	109,672	127,481
Water Authority Supplies	328,700	328,700	328,700	328,700	328,700
Metropolitan Allocation (Preferential Right)	335,878	310,123	310,205	310,286	310,368
Total Estimated Core Supplies without Storage Takes	818,340	791,468	771,887	748,658	766,549
Total Multi Dry-Year Demands with Conservation Savings	580,626	586,432	592,296	598,219	604,201
Potential Supply (Shortage) or Surplus (difference between supplies and demands)	237,714	205,036	179,591	150,439	162,348
Use of Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	818,340	791,468	771,887	748,658	766,549
Remaining Potential Surplus Supply, or (Shortage) to be addressed through Management Actions	237,714	205,036	179,591	150,439	162,348

^a Member agency local supplies include verifiable recycling and brackish groundwater recovery, San Luis Rey water transfer, seawater desalination, as well as dry-year estimates for surface water and groundwater.

Table 9-4. 2026–2030 Multiple Dry Water Year Supply and Demand Assessment (AF/YR)

	2026	2027	2028	2029	2030
Member Agency Supplies ^a	213,285	209,508	190,545	167,935	151,180
Water Authority Supplies	328,700	328,700	328,700	328,700	328,700
Metropolitan Allocation (Preferential Right)	336,320	310,531	310,613	310,694	310,776
Total Estimated Core Supplies without Storage Takes	878,305	848,739	829,858	807,329	790,656
Total Multi Dry-Year Demands with Water Conservation Savings	602,935	608,964	615,054	621,204	627,416
Potential Supply (Shortage) or Surplus (difference between supplies and demands)	275,370	239,775	214,804	186,125	163,240
Use of Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	878,305	848,739	829,858	807,329	790,656
Remaining Potential Surplus Supply, or (Shortage) to be addressed through Management Actions	275,370	239,775	214,804	186,125	163,240

^a Member agency local supplies include verifiable recycling and brackish groundwater recovery, potable reuse, San Luis Rey water transfer, seawater desalination, as well as dry-year estimates for surface water and groundwater.

Table 9-5. 2031–2035 Multiple Dry Water Year Supply and Demand Assessment (AF/YR)

	2031	2032	2033	2034	2035
Member Agency Supplies ^a	216,105	211,648	192,005	168,715	210,640
Water Authority Supplies	328,700	328,700	328,700	328,700	328,700
Metropolitan Allocation (Preferential Right)	336,762	310,939	311,021	311,102	311,184
Total Estimated Core Supplies without Storage Takes	881,567	851,287	831,726	808,517	850,524
Total Multi Dry-Year Demands with Water Conservation Savings	625,067	631,318	637,631	644,008	650,448
Potential Supply (Shortage) or Surplus (difference between supplies and demands)	256,500	219,969	194,095	164,509	200,076
Use of Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	881,567	851,287	831,726	808,517	850,524
Remaining Potential Surplus Supply, or (Shortage) to be addressed through Management Actions	256,500	219,969	194,095	164,509	200,076

^a Member agency local supplies include verifiable recycling and brackish groundwater recovery, potable reuse, San Luis Rey water transfer, seawater desalination, as well as dry-year estimates for surface water and groundwater.

Table 9-6. 2036–2040 Multiple Dry Water Year Supply and Demand Assessment (AF/YR)

	2036	2037	2038	2039	2040
Member Agency Supplies ^a	275,565	271,108	251,465	228,175	210,740
Water Authority Supplies	328,700	328,700	328,700	328,700	328,700
Metropolitan Allocation (Preferential Right)	337,204	311,347	311,429	311,510	311,592
Total Estimated Core Supplies without Storage Takes	941,469	911,155	891,594	868,385	851,032
Total Multi Dry-Year Demands with Water Conservation Savings	645,703	652,160	658,681	665,268	671,921
Potential Supply (Shortage) or Surplus (difference between supplies and demands)	295,766	258,995	232,913	203,117	179,111
Use of Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	941,469	911,155	891,594	868,385	851,032
Remaining Potential Surplus Supply, or (Shortage) to be addressed through Management Actions	295,766	258,995	232,913	203,117	179,111

^a Member agency local supplies include verifiable recycling and brackish groundwater recovery, potable reuse, San Luis Rey water transfer, seawater desalination, as well as dry-year estimates for surface water and groundwater.

Table 9-7. 2041–2045 Multiple Dry Water Year Supply and Demand Assessment (AF/YR)

	2041	2042	2043	2044	2045
Member Agency Supplies ^a	275,665	271,208	251,565	228,275	210,840
Water Authority Supplies	328,700	328,700	328,700	328,700	328,700
Metropolitan Allocation (Preferential Right)	337,646	311,755	311,837	311,918	312,000
Total Estimated Core Supplies without Storage Takes	942,011	911,663	892,102	868,893	851,540
Total Multi Dry-Year Demands with Water Conservation Savings	661,605	668,221	674,903	681,652	688,469
Potential Supply (Shortage) or Surplus (difference between supplies and demands)	280,406	243,442	217,199	187,241	163,071
Use Carryover Supplies	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	942,011	911,663	892,102	868,893	851,540
Remaining Potential Surplus Supply, or (Shortage) to be addressed through Management Actions	280,406	243,442	217,199	187,241	163,071

^a Member agency local supplies include verifiable recycling and brackish groundwater recovery, potable reuse, San Luis Rey water transfer, seawater desalination, as well as dry-year estimates for surface water and groundwater.

In *Section 10 Scenario Planning – Managing an Uncertain Future*, scenarios are presented that modify dry-year supplies available for allocation. This total supply assumes reduced deliveries from the State Water Project and CRA, along with limited storage supplies. This conservative approach is based on the Water Authority’s experience with previous five-year droughts and its adverse impacts on imported water supplies.

The multiple dry-year demands utilizes the single dry-year demand projection, preceding the multi-year period, as the basis for the start of the dry/hot cycle and then increases the following five years at 1% annually to account for growth. This method for assessing multiple dry-year events was used to account for the anticipated mitigation of water demand increases that would normally be associated with hot/dry weather, due to implementation of Water Authority and its member agencies’ demand management measures as they respond to the extended drought conditions.

9.4.3 Demand Hardening

The amount of extraordinary conservation savings expected to be achieved through mandatory measures, such as water-use restrictions, could be less than that experienced during previous shortage periods due to demand hardening. Responsiveness to drought pricing and general price increases may diminish because remaining essential uses are less responsive to price. Shortage management measures such as water-use restrictions may not be as effective in the future in achieving necessary savings to help reduce the supply gap. This may reduce customer discretionary demands and create less flexibility when managing demand during shortages,

which may increase the importance of acquiring supplemental dry year supplies to eliminate or reduce potential supply shortages.

Section 11.4 Water Authority Dry Year Supplies and Carryover Storage discusses the Water Authority's potential dry year supplies. Long-term permanent conservation savings are critical to ensuring water is used most efficiently and will help avoid or mitigate drought impacts.

9.5 Reliability of Supply

The above sections identify a diverse mix of resources that are planned to meet future demands during both normal and dry years. Implementation of this regional resource mix will require maintaining and developing projects and programs by the Water Authority, its member agencies, and Metropolitan. The Water Authority coordinated with its member agencies during preparation of the 2020 UWMP on future demands and supplies projected for the San Diego region. Steps being taken by member agencies and Metropolitan to develop supplies are addressed in their respective UWMPs. *Section 4 Water Authority Supplies* describes the steps taken and remaining actions necessary to develop and maintain Water Authority supplies.

The UWMP Act requires agencies to describe the reliability of the water supply and any vulnerability to seasonal and climatic shortage. Section 9.3 and 9.4 above describe water supply reliability assessment results for the San Diego region during normal water years, single dry-years, and multiple dry-years. The UWMP Act also requires the 2020 UWMPs to provide historical data about water supplies available for these three water year types. The following are the historic total supplies, both local and imported, that were utilized during the periods identified: Normal water year supply, based on average from 1986 to 2018 (surface water and groundwater); single dry-year supply, based on 2015; and multiple dry-year supply, based on 2011 to 2015.

Supplies used during a non-allocation dry period could exceed the supplies used during a normal year given the ability to purchase additional imported supplies from Metropolitan. In *Section 9.3 Normal Water Year Assessment*, with the exception of surface water and groundwater supplies, average local supply production is not based on historical yields, but are projected yields provided by member agencies. These figures more accurately reflect expected local yield based on member agencies current policies, as well as procedures regarding supply operations and management.

Consistent monitoring of supply and demand, and making necessary modifications to core and dry year resources, as identified in the normal and dry year resource mixes, is key to long-term water supply reliability. As such, the Water Authority Board will continue to monitor the reliability of existing supplies and development of identified future supplies through an annual Water Supply and Demand Assessment and five-year updates to the UWMP.

The UWMP Act requires that, for any water source that may not be available at a consistent level of use given specific legal, environmental, water quality, or climatic factors, the agency

describe, to the extent practicable, plans to replace that source with alternative sources or water demand management measures. As stated throughout this 2020 UWMP, the Water Authority and its member agencies have made significant strides and are planning to further develop a diverse and reliable ensemble of water resources. The unavailability of any one supply source will be buffered by this planned diversity in supply; the San Diego region does not rely on a single water source. To supplant or supplement an existing water supply, the Water Authority could take steps to further bolster long-term water use efficiency and work with member agencies to maximize development of recycled water, potable reuse, groundwater, and seawater desalination. A scenario planning process, which is described in *Section 10 Scenario Planning – Managing an Uncertain Future*, was employed to adequately plan for potential supply uncertainties and identify alternative supply sources.

9.6 Drought Risk Assessment

Water Code Section 10635(b) requires a water supplier to include in its 2020 UWMP a drought risk assessment (DRA). The DRA must include a description of the data, methodology, and basis for shortage conditions that are necessary to conduct a DRA for a period that lasts five consecutive years. The DRA must also include a determination of the reliability of each supply source and a comparison of available water supplies and projected demands. Water suppliers may consider impacts from climate change, regulations, and other locally applicable criteria.

The Water Authority's DRA assesses a projected drought over the next five-year period from 2021 – 2025. The historical period used in the analysis to represent the Water Authority's driest consecutive five-year period are years 2014 – 2018. Those years represent the five-year period with the lowest local water supply production from surface water and groundwater, the two local water supplies that are most susceptible to variation due to weather. Over that period, the combined annual production from those sources ranged from a high of 67,374 AF to a low of 21,245 AF.

The data used to calculate the Water Authority's supply capabilities under the scenario of five consecutive dry years is shown in Table 9-9 . For each year, a comparison was made between available water supplies and water demands. For the Water Authority supplies, which consist of the Imperial Irrigation District water transfer, AAC and CC lining projects, and regional seawater desalination, no reduction in the availability over the five-year period is assumed due to the drought resilience of these supplies. Information on these supplies can be found in *Section 4 Water Authority Supplies*. For the member agency supplies, only surface water and groundwater are considered to be susceptible to variations in weather. The volume of those supplies varies over the five-year period based on actual production from 2014 – 2018. Additional information on the member agency supplies can be found in *Section 5 Member Agency Supplies*. For Metropolitan supplies, the volume of water for each year is based on the Water Authority's estimated preferential right to Metropolitan purchases. Information on

Metropolitan’s water supplies can be found in *Section 6 Metropolitan Water District of Southern California*.

Once the available water supplies are calculated for each year of the DRA, the total is compared to the projected demands for each year. The demands for 2021 – 2025 were projected by taking estimated CY 2020 demands of 482,624 AF and escalating them annually for five years based on the multipliers in Table 9-8. The multipliers were based on a weather index developed to assess the impact of dry/hot weather on water demands. The dry/hot index was derived by combining historical observations on average maximum daily temperature and precipitation into a single indicator where higher values represent hotter-drier conditions. Specifically, the index was constructed from weather parameters of the water demand forecasting models and used to determine the multipliers for consecutive dry/hot weather. The multipliers result in a sizable increase in 2021 water demand and incremental increases in demands over the remaining four years. This allows for a robust assessment of the Water Authority’s ability to meet dry year demands over the projected five-year period. Based on the analysis shown in Table 9-9, the Water Authority has a surplus of water supplies in all five years and therefore, actions under the WSCP are not required.

Table 9-8. 2021 – 2025 Demand Projection Multipliers

	2021	2022	2023	2024	2025
Multiplier	108%	112%	116%	120%	125%

Table 9-9. 2021 – 2025 Drought Risk Assessment (AF/YR) ^a

	2021	2022	2023	2024	2025
Water Authority Supplies					
Imperial Irrigation District Water Transfer	200,000	200,000	200,000	200,000	200,000
ACC and CC Lining Projects	78,700	78,700	78,700	78,700	78,700
Regional Seawater Desalination	50,000	50,000	50,000	50,000	50,000
<i>Subtotal</i>	328,700	328,700	328,700	328,700	328,700
Member Agency Supplies					
Surface Water	20,375	6,004	15,660	51,190	21,674
Water Recycling	24,660	24,660	24,660	24,660	24,660
Seawater Desalination	5,500	5,500	5,500	5,500	5,500
Potable Reuse	0	3,360	3,360	3,360	3,360
Brackish GW Recovery	9,333	9,333	9,333	9,333	9,333
Groundwater	18,365	15,241	13,694	16,184	15,703
San Luis Rey Water Transfers	15,823	15,823	15,823	15,823	15,823
<i>Subtotal</i>	94,056	79,921	88,030	126,050	96,053
Metropolitan Water District Supplies	335,878	310,123	310,205	310,286	310,368
Total Projected Supplies without Storage Takes	758,634	718,744	726,935	765,036	735,121
Total DRA Dry Year Demands with Water Conservation Savings	521,234	542,367	558,193	578,179	605,225
Potential Supply (Shortage) or Surplus	237,400	176,377	168,742	186,857	129,896
Impacts of WSCP Actions	0	0	0	0	0
Total Projected Core Supplies with Use of Carryover Storage Supplies	758,634	718,744	726,935	765,036	735,121
Remaining Potential Surplus Supply, or (Shortage) that will be addressed through Management Actions	237,400	176,377	168,742	186,857	129,896

^a Surface water and groundwater values based on lowest 5-year average of water use for these sources of supplies (CY 2014 – 2018). All other local supplies held constant at actual CY 2020 levels. Table assumes same schedule of Metropolitan total supply ramp-down from multi dry-year scenario. DRA dry year demands based on actual 2020 consumptive use and adjusted using multiple dry-year scales.

9.7 References

Metropolitan Water District of Southern California. 2014. *Water Supply Allocation Plan*.

SECTION 10 SCENARIO PLANNING - MANAGING AN UNCERTAIN FUTURE

10.1 Introduction

The Water Authority's water supply reliability assessment is detailed in *Section 9 Water Supply Reliability* of this 2020 UWMP. The UWMP Act requires that for any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, the agency must describe to the extent practicable, plans to replace that source with alternative water sources or water demand management measures.

To adequately assess the reliability of the San Diego region's future resource mix and plan for any potential uncertainties regarding water supply sources, this 2020 UWMP incorporates a traditional scenario-based planning process. This process assesses potential risks associated with implementation of projected resource mixes and identifies management strategies to help address potential uncertainty. A procedure to track development of supply sources to determine when and if potential adaptive management strategies may be needed is also included.

One resource document used for selection of the traditional scenario planning approach was the Water Utility Climate Alliance's (WUCA) *Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning* (WUCA Report; WUCA, 2010).

10.2 Traditional Scenario Planning Process

Various decision support planning methods are available to planners that incorporate uncertainty and risk assessment into water planning. The traditional scenario planning was selected for this 2020 UWMP based on the following characteristics:

- Used for uncertainty analysis specific to water resources/water utility planning
- Develops a small but wide-ranging set of future scenarios to test, making planning decisions more robust
- Highly transparent, and easily implemented with a medium level of development by internal staff; outside expertise is not required
- Does not require extensive computer processing power; can accommodate changes in assumptions, inputs and objectives
- Uses concepts familiar to stakeholders, improves understanding and communicability, and avoids the "black box" issue

Key steps of the 2020 UWMP scenario planning process are listed and described below.

1. Define the focal issue or central question for the process that will be assessed and ultimately answered through the process
2. Identify the projected water resource supply mix

3. Identify critical uncertainties that could influence implementation of the mix
4. Formulate potential scenarios based on the critical uncertainties
5. Identify common strategies to manage the scenarios
6. Establish key tracking metrics that evaluate the status of supply sources in the projected resource mix and whether adaptive management strategies are required to ensure continued reliability

10.2.1 Define the Focal Issue or Central Question

The focal issue or central question for assessment and ultimately answered through the scenario planning process is as follows:

In a climate of supply uncertainty and scarcity, how will the Water Authority and its member agencies adaptively provide a water supply that is reliable and drought-resilient over the next 25 years?

10.2.2 Identify Projected Water Resource Mix

As discussed in *Section 9 Water Supply Reliability*, in coordination with the member agencies, a projected resource mix to meet future demands was generated in five-year increments. For the scenario planning process, the 2040 projected resource mix was selected to evaluate the region's long-term supply planning efforts. The normal weather resource mix in 2040 is based on the following factors:

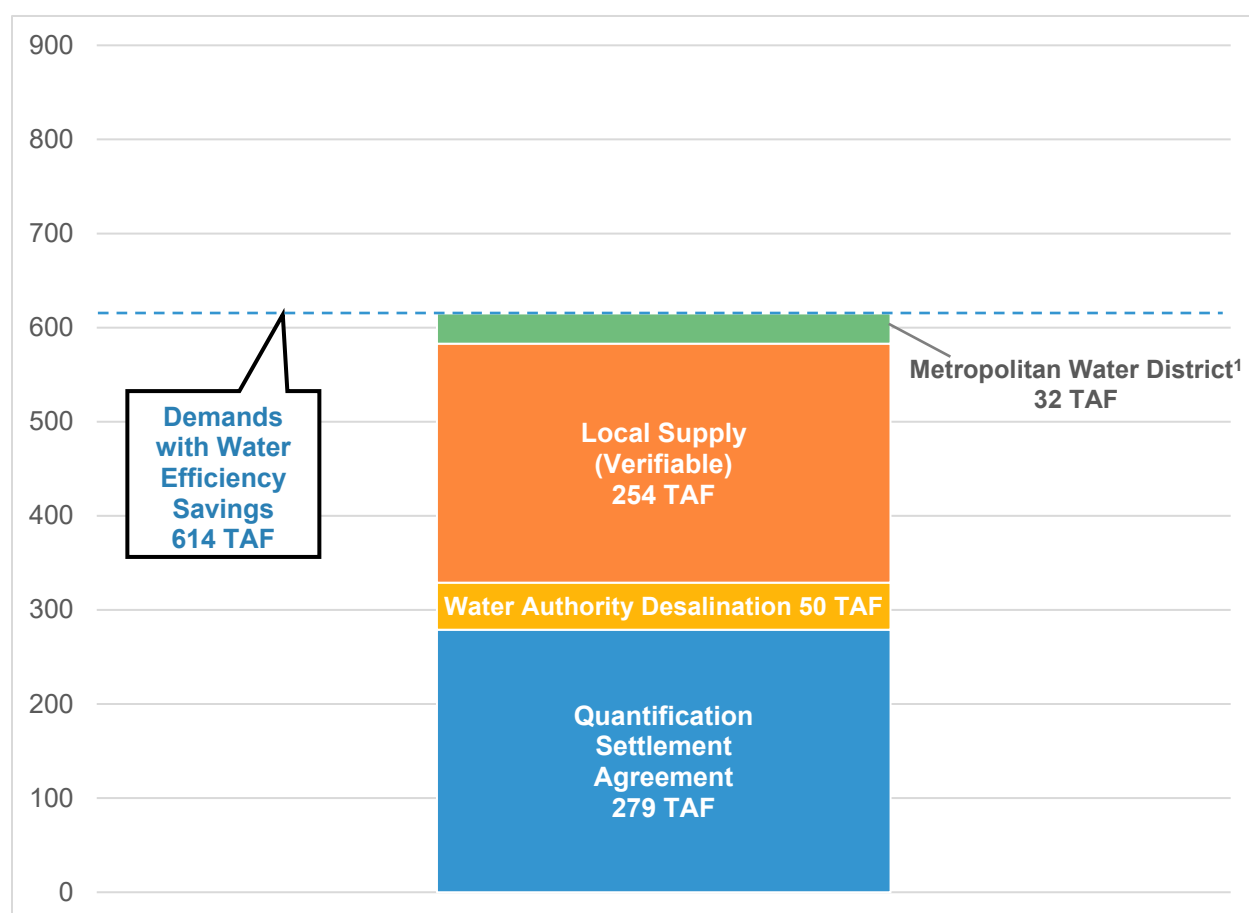
- Member agency implementation of projected verifiable projects
- Member agency long-term water efficiency savings
- Average yield from surface and groundwater supplies
- Water Authority's QSA supplies delivered in accordance with agreements
- Deliveries from the Carlsbad Desalination Plant in accordance with the Water Purchase Agreement

To determine Metropolitan's supply to the Water Authority, Metropolitan's preferential rights allocation methodology was used. In 2040, the Water Authority's preferential right is estimated to be approximately 26% with Metropolitan at 1.5 million AF of supply available (refer to *Section 6.1.1 Metropolitan Act Section 135 – Preferential Right to Water* for details about preferential rights).¹ However under normal weather conditions (i.e., average climatological values for a given period), Metropolitan is able to meet the Water Authority's supplemental needs.

Figure 10-1 shows the projected water resource mix for 2040 under normal weather conditions. It should be noted that water demand in the scenarios below are net of projected member agency long-term water use efficiency savings.

¹ Following the finalization of the Appellate Court's ruling in 2017, Metropolitan updated how it calculates member agencies' preferential rights to include the Water Authority's payments for Metropolitan's transportation services. This correction significantly increased the Water Authority's preferential right compared to what it was in the past.

Figure 10-1. 2040 Normal Year (Thousand Acre-Feet (TAF))



¹ Normal year preferential right is 1.5 MAF, maximum from MWD is 390 TAF

As shown in Figure 10-1, if the projected Metropolitan, Water Authority, and member agency supplies are maintained and developed as planned, no shortages are anticipated in the Water Authority's service area in 2040 under normal water year conditions. Consistent with UWMP Act requirements, it is important that a risk assessment is conducted on the projected resource mix to ensure long-term reliable and sustainable water supplies to meet demand. This is accomplished through the scenario planning process.

10.2.3 Critical Uncertainties Associated with Implementation of Projected Resource Mix

Following identification of the projected resource mix, the next step in the scenario planning process is to identify critical uncertainties surrounding implementation of the mix. Critical uncertainties are listed below based on information from source documents such as the *California Water Plan Update 2018* (DWR, 2019). The list below does not include all uncertainties, but focuses on critical uncertainties associated with water supply planning reliability. For example, managing uncertainties associated with physical system reliability, such as a potential pipeline failure, is handled through the Water Authority's *Integrated Contingency*

Plan: Emergency Operations Plan. These critical uncertainties form the basis for developing potential future scenarios. To aid in the process of formulating potential scenarios, uncertainties were categorized by whether the source of change was gradual over the long term or more sudden.

Table 10-1. Critical Uncertainties Associated with Implementation of Projected Resource Mix

Sources of Gradual Change and Uncertainty	Sources of Sudden or Short-term Change and Uncertainty
Demographic Growth deviates from SANDAG Forecast	Droughts Severity, timing, and frequency
Climate Change Impacts from long-term changes in temperature and precipitation, including changes to <ul style="list-style-type: none"> • Snowpack • Hydrologic Patterns • Rainfall • Sea Level Rise 	Changing Policies/Regulations/Laws/Social Attitudes <ul style="list-style-type: none"> • Regulatory restrictions that further limit supply availability • Emerging Contaminants • Endangered Species • Plumbing Codes
State Water Project Reliability Willingness to pay for Delta Conveyance	Delta Levee Breach Delta levees fail due to earthquake or flooding and supplies are curtailed from State Water Project
Local Supplies not Developed as Planned	

Notes: Format adopted from DWR California Water Plan Update 2018, Chapter 2

10.2.4 Scenario Analysis: Future Potential Scenarios Based on Critical Uncertainties

The *WUCA Report* states “Traditional scenario planning, also known as traditional scenario analysis, is a methodology that relies on developing future scenarios that consider a variety of potential future situations” (WUCA, 2010). The scenarios are plausible, but they are not predictions or forecasts of the future. These scenarios incorporate water supply uncertainties that urban water planners face and can be qualitative, quantitative, or both. For traditional scenario planning, it is important to select and limit analysis to scenarios that focus on critical uncertainties. Based on the results of this scenario analysis, common strategies are then developed to manage uncertainties. The Water Authority’s five potential scenarios developed based on supply uncertainties are described below.

Table 10-2. Future Potential Scenarios Identified for Planning Purposes

Future Potential Scenarios Identified for Planning Purposes	
1	Drought
2	Drought with Further Limitations on Metropolitan Supplies
3	Drought with Limited Metropolitan Supplies and Member Agency Local Supplies
4	Demographic Shift
5	Climate Change

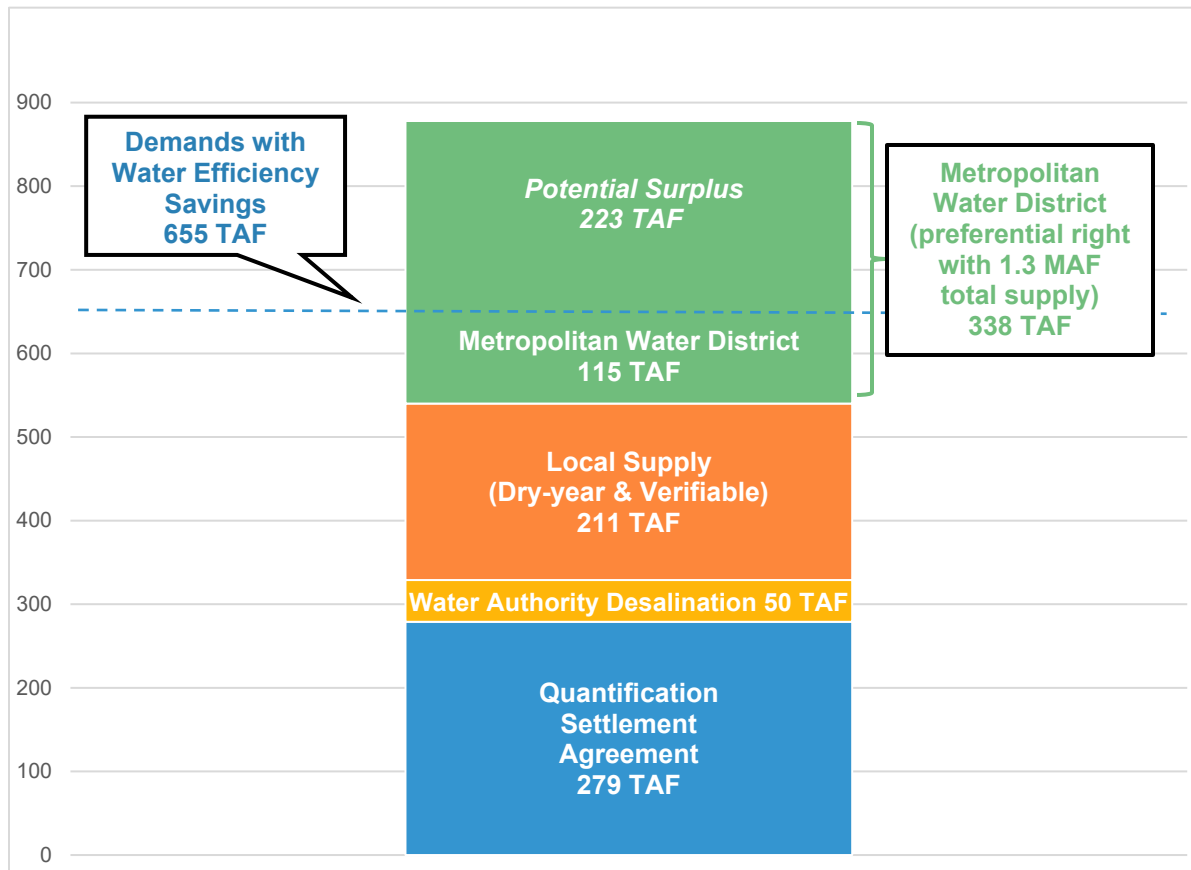
10.2.4.1 Scenario 1: Drought

Scenario 1 assumes a dry water year and was developed based on the following factors:

- Single dry year demand derived using CWA-MAIN modeling, an econometric forecasting model that applies statistical methods to economic data (see *Section 2, Water Demands*).
- Metropolitan is allocating supplies due to dry conditions, and it is unknown how Metropolitan will allocate supplies in the long term. For conservative planning purposes, the Water Authority's allocation is based on its preferential right to purchase supplies from Metropolitan. In 2040, that right is estimated to be approximately 26% with 1.3 million AF of supply available (Section 6.1.1).
- Surface and groundwater supply yields reduced based on 2040 dry-year supplies.
- Verifiable member agency projected water recycling, brackish groundwater, potable reuse, seawater desalination and San Luis Rey water transfer supplies.
- Water Authority's QSA supplies delivered in accordance with agreements.
- Water Authority deliveries from the Carlsbad Desalination Plant made in accordance with the Water Purchase Agreement.

The projected mix of supplies and potential surplus are shown in Figure 10-2.

**Figure 10-2. Scenario 1: Drought (2040)
(Thousand Acre-Feet (TAF))**



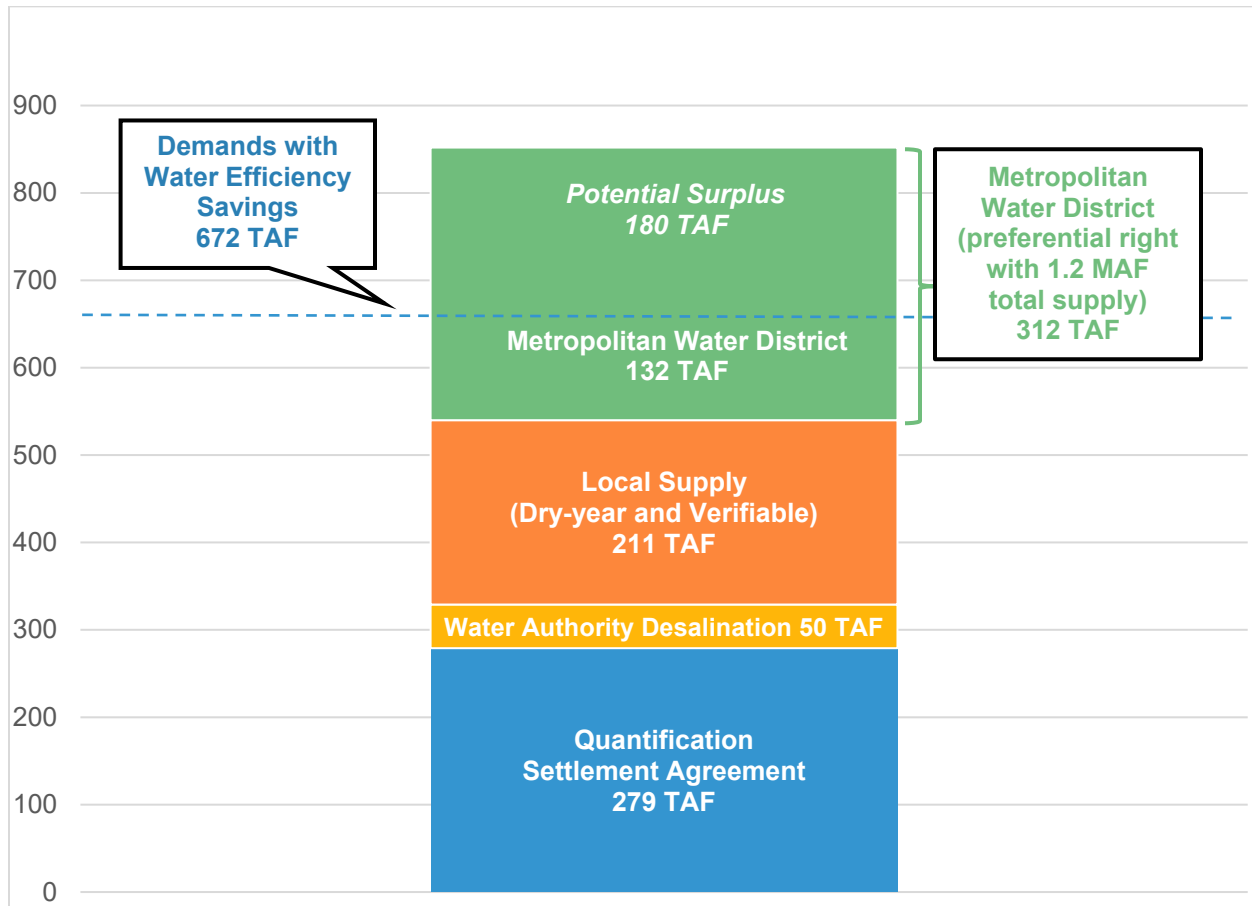
10.2.4.2 Scenario 2: Drought with Further Limitations on Metropolitan Supplies

Scenario 2 was developed using the same variables identified in Scenario 1 with the following modification:

- Metropolitan supplies are further limited and being allocated to the member agencies due to a prolonged multi-year drought as follows:
 - Metropolitan limited to 1.2 million AF of supplies due to dry conditions and increased reductions in deliveries from State Water Project (i.e., no Bay-Delta improvements occur) or reduction in Colorado River deliveries.
 - Water Authority receives their estimated preferential right allocation of 26%.

The projected mix of supplies and potential surplus are shown in Figure 10-3.

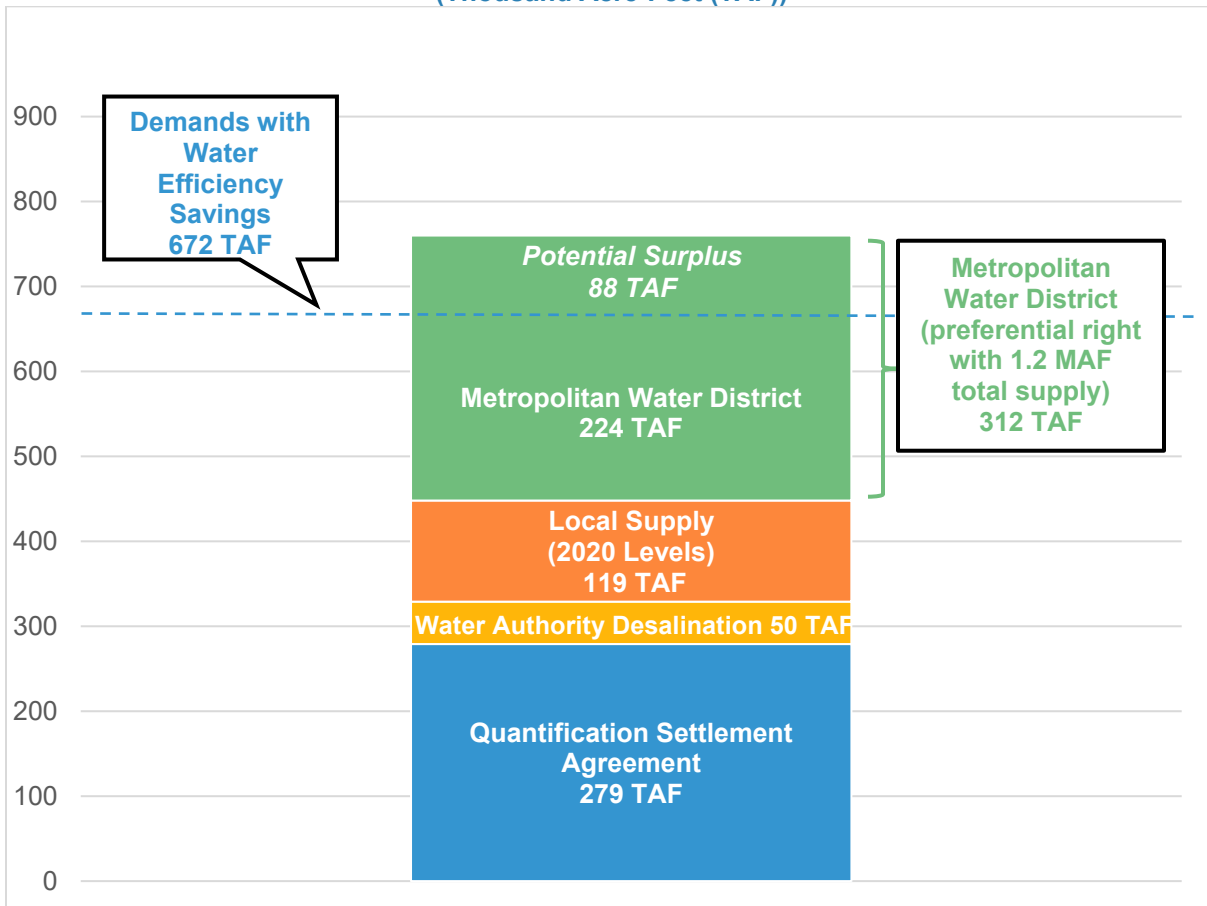
Figure 10-3. Scenario 2: Drought with Further Limits on Metropolitan Supplies (2040)
(Thousand Acre-Feet (TAF))



10.2.4.3 Scenario 3: Drought with Limited Metropolitan Supplies and Member Agency Local Supplies

Scenario 3 was developed using the same variables as those identified in Scenario 2, except that the verifiable recycled, potable reuse, and groundwater supplies are not developed as planned and remain at 2020 levels. The projected mix of supplies and potential surplus are shown in Figure 10-4.

Figure 10-4. Scenario 3: Drought with Limited Metropolitan and Member Agency Local Supplies (2040)
(Thousand Acre-Feet (TAF))



10.2.4.4 Scenario 4: Demographic Shift

As discussed in *Section 2 Water Demands*, the Water Authority's demand projections are driven by SANDAG's most recent regional growth forecast. In turn, the regional growth forecast is based on the San Diego region cities and County general plans. In Scenario 4, land use development approval would differ from that identified in the general plans. Depending on the variation in housing type, demands could be higher or lower. Single-family homes with larger lots (i.e., homes with a lower population density and potentially more irrigated landscape) would generally use more water than multi-family units (i.e., homes with a higher population density).

One potential scenario that would cause higher than projected demand is if multi-family units included in the growth forecast are approved as single-family units. The magnitude of a potential housing type shift is difficult to quantify. The effect on water demands due to a shift in demographics would be a gradual change, and would be captured in each five-year update to the UWMP. Projected demand in UWMP updates would be based on SANDAG's most recent growth forecast, which would reflect changes to land use plans occurring between UWMP

updates. In part to deal with uncertainty associated with land use approvals occurring during the 2020 UWMP planning horizon, an additional demand increment (i.e., accelerated forecasted growth), has been included in the regional total demand forecast, as discussed in *Section 2 Water Demands*.

10.2.4.5 Scenario 5: Climate Change

Scenario 5 considers the potential influence climate change may have on the projected resource mix. Because there are still too many uncertainties regarding the impact of climate change on supply and demand, a qualitative risk assessment was conducted. The assessment was based primarily on *Managing an Uncertain Future: Climate Change Adaptation Strategies for California's Water* (Hanak and Lund, 2008).

When evaluating the effects of climate change on long-term water supply planning, a distinction should be made between climate and weather. Weather consists of the short-term (i.e., minutes to months) changes in the atmosphere. Climate is how the atmosphere behaves over relatively long periods of time. Climate change refers to changes in long-term averages of daily weather conditions. Changes to climate will be gradual, providing water supply agencies the ability to adapt planning strategies to manage for the supply uncertainties. The effect on supply would be captured in each five-year update to the UWMP.

Researchers have concluded that increasing atmospheric concentrations of GHGs such as carbon dioxide are causing Earth's air temperature to rise. While uncertainties remain regarding the exact timing, magnitude, and regional impacts of the temperature and potential precipitation changes due to climate change, researchers have identified several areas of concern that could influence long-term water supply reliability. These potential areas of concern are listed below.

Loss of Natural Snowpack Storage

Rising temperatures reduce snowpack in the Sierra Nevada because more precipitation falls as rain, and snowmelt occurs sooner. Snowpack in the Sierra Nevada is the primary source of supply for the State Water Project. Snowpack is often considered a large surface reservoir, where water is slowly released between April and July each year. Much of the state's water infrastructure was designed to capture this slow spring runoff and deliver it during the drier summer and fall months. DWR projects that the Sierra Nevada snowpack will experience a 25% to 40% reduction from its historical average by 2050.

Sea-Level Rise

Rising sea levels could increase the risk of damage to water and water recycling facilities from storms, high tide events, and erosion of levees. A potential catastrophic levee breach in the Delta could interrupt supplies from the State Water Project, potentially reducing supply deliveries to the San Diego region from Metropolitan. In addition, rising sea levels could cause saltwater intrusion into the Delta, degrading drinking water quality. More freshwater releases

from upstream reservoirs would be required to repel seawater and maintain salinity levels for municipal, industrial, and agricultural uses.

Changes in Average Precipitation and Runoff Volume

The effect of climate change on overall precipitation and runoff volumes is still unclear and highly uncertain. For example, a number of studies conclude that the flow of the Colorado River may be reduced by climate change, but wide disparity exists on the predicted volume of that change. Yield from local surface water resources could potentially be reduced if annual runoff volumes are reduced due to a decline in precipitation, or if an increase occurs in evapotranspiration in reservoirs. Research has yet to clarify how precipitation levels may be impacted by climate change.

Change in Frequency and Intensity of Droughts

Warming temperatures, combined with potential changes in rainfall and runoff patterns, could exacerbate the frequency and intensity of droughts.

Demand Levels

Climate change could also gradually affect water demands out in the future. Warmer temperatures increase evapotranspiration rates and the growing season, which are likely to increase outdoor consumptive water use for landscaping. As part of the water demand forecasting effort for this 2020 UWMP, the long-term influence of climate change on demands in the San Diego region was evaluated (refer to analysis results in *Section 2 Water Demands*).

All five potential areas of concern discussed above focus on the potential effect climate change could have on future supply reliability. The overall potential long-term effect is a possible decrease in the availability of imported supplies from Metropolitan and local supplies, causing a potential gap between supply and demand. In addition, supply and demand impacts from climate change will start to be experienced within the 2020 UWMP 25-year planning horizon, and should be considered when establishing resilient “no regret” strategies that provide water supply benefits within the planning horizon, while also increasing the Water Authority’s ability to manage potential climate change impacts in the future. These strategies are precautionary and aim to respond to possible negative impacts before they intensify.

10.2.5 Strategies to Strengthen Implementation of Resource Mix and Manage Uncertainty Scenarios

For each projected scenario above, including the projected resource mix, management strategies were identified to strengthen the likelihood of development of identified resources. The strategies are common to all the planning scenarios, meaning that such projects and programs would be useful under a range of possible outcomes. As a result, these strategies are more likely to be viable as the future unfolds. These strategies include individual elements that consist of policies and programs and potential construction projects. The 2020 UWMP

management strategies included in the scenario planning process are derived from previous Board actions on policies and programs surrounding supply reliability and development.

Listed in Table 10-3 are the strategies the Water Authority can use to implement supplies identified in the projected resource mix and manage uncertainty in planning scenarios. These strategies focus on programs which are consistent with Board policy. In addition, member agency projects such as potable reuse, not only provide the agency a supply reliability benefit, but can also provide other benefits, such as reducing wastewater flows to a downstream treatment plant and ultimately the ocean.

Table 10-3. Potential Common Strategies to Strengthen Implementation of Projected Resource Mix and Manage Uncertainty Scenarios

Potential Water Authority Policies/Programs
<p>Foundational Strategy</p> <p>Reduce reliance on Metropolitan supply sources to ensure the existing and projected water resource mix is reliable and drought resilient.</p>
<p>Member Agency Local Projects</p> <p>Provide technical assistance to member agencies in the planning, design, and construction of local projects.</p> <p>Advocate at local, state, and federal levels for minimizing regulatory constraints and enacting acceptable and practicable regulatory standards that allow member agencies to maximize local supply project development.</p> <p>Advocate for state and federal funding for local projects and work with agencies to ensure projects qualify for funding.</p>
<p>Water Conservation</p> <p>Offer programs that encourage long-term behavioral change toward measurable reductions in outdoor water use.</p>
<p>Climate Change</p> <p>Encourage focused scientific research on the effects of climate change to identify the impacts on the San Diego region's imported and local water supplies.</p>

In Scenario 5, the strategies outlined in Table 10-3 could also be used to manage supply uncertainty associated with a changing climate. For example, the foundational strategy to diversify the San Diego region's resource mix through developing local projects such as recycled water and seawater desalination reduces reliance on imported and local surface supplies, whose yields could potentially decrease as a result of climate change. Strategies identified in this section provide supply reliability benefits within the planning horizon while increasing the ability to manage potential climate change impacts in the future.

10.2.6 Key Tracking Metrics: Track Progress on Implementation of Projected Resource Mix and Need for Adaptive Strategies

Through scenario planning analysis, a projected resource mix plus the five uncertainty scenarios were identified. Potential strategies to strengthen implementation of the resource mix and

manage uncertainty in the planning scenarios were also identified. The final step that links these two components is establishing key tracking metrics to evaluate the status of supply sources in the projected resource mix, and determining whether adaptive management strategies are required to ensure continued reliability.

As shown in Table 10-4, a complete evaluation and update of the resource mix will occur every five years with the UWMP update. In addition, Water Code Section 10632.1 requires water suppliers to prepare an annual water supply and demand assessment. The Water Authority's process to prepare its annual assessment is described in Section 11.3.2. If necessary, reporting to the Board on issues related to implementation of the resource mix could occur more frequently.

Table 10-4. Tracking Progress on Implementation of Resource Mix

Time Interval	Deliverable	Purpose
Annually	Water Supply and Demand Assessment	Using key indicators, perform annual water supply and demand assessment to evaluate the Water Authority's supplies and demands
At least every five years	UWMP Update	Evaluate supply and demand conditions, and update projected resource mix
As needed	Reports to Board	Update the Board on issues impacting resource mix implementation

10.2.7 Conclusion

As identified at the beginning of the scenario planning process, the focal question is as follows:

In a climate of supply uncertainty and scarcity, how will the Water Authority and its member agencies adaptively provide a water supply that is reliable and drought-resilient over the next 20 years?

Based on the results of the scenario planning process, the Water Authority and its member agencies can help ensure a long-term reliable water supply for the region through the following measures:

1. Continue to implement the diverse resource mix identified in this 2020 UWMP, including continued water-use efficiency measures
2. Continue to implement additional planned local projects, with a priority on member agency projects, that will strengthen implementation of the projected resource mix, continue to reduce reliance on Metropolitan supply sources, and manage potential shortfalls, if any, in development of supplies identified in the resource mix
3. Conduct annual tracking and reporting on implementation of the mix that will allow the Water Authority and its member agencies to adjust based on actual supply availability and conditions, and take appropriate action if necessary if supplies in the resource mix are not developed as planned

10.3 References

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SECTION 11 WATER SHORTAGE AND DROUGHT PLANNING

11.1 Introduction

This section discusses potential actions the Water Authority could take to address supply shortages due to a catastrophe, drought, or other situations. It also highlights elements of the Water Authority's Water Shortage Contingency Plan, including actions to be taken in response to various water shortage levels and the process to perform an annual water supply and demand assessment.

11.2 Catastrophic Water Shortage

A catastrophic water shortage occurs when an event, such as an earthquake results in insufficient water to meet the region's needs or eliminates access to imported water supplies. This section describes the Water Authority's Integrated Contingency Plan (ICP) and Emergency Storage Project (ESP), both of which were developed to protect public health and safety and to prevent or limit economic damage that could occur from a severe shortage of water supplies. For information related to seismic risk in the Water Authority's service area, please refer to the *San Diego County Multi-Jurisdictional Hazard Mitigation Plan* that is included as Appendix E of the WSCP.

The Water Authority's ICP and ESP describe actions to be taken in the event of an earthquake or power outage. The ESP describes actions that the Water Authority will take to operate ESP facilities to address up to a six-month supply interruption, which for example, might result from an earthquake (refer to *Section 11.2.2 Emergency Storage Project* below). As discussed in the ICP, the Water Authority has prepared for potential power outages by operating and testing standby and mobile generators that can provide power for essential or critical activities for at least one hour. Power outages may occur as a result of natural events such as an earthquake and flooding, or humanmade events such as a terrorist act.

11.2.1 Integrated Contingency Plan

The Water Authority's ICP provides staff with the information necessary to respond to an emergency that causes severe damage to the Water Authority's water distribution system, or that impedes the Water Authority's ability to provide reliable water service to its member agencies. The ICP describes the situations and incidents that will trigger activation of the Water Authority's ICP and Emergency Operations Center. It also provides direction and strategies for responding during a crisis. The Water Authority's ICP includes the following:

- Authorities, policies, and procedures associated with emergency response activities
- Emergency Operations Center activities, including activation and deactivation guidelines

- Multi-agency and multi-jurisdictional coordination, particularly between the Water Authority, its member agencies, and Metropolitan in accordance with Standardized Emergency Management System and National Incident Management System guidelines
- Incident Command System management and organization and emergency staffing required to help mitigate any significant emergency or disaster
- Mutual Aid Agreements and covenants that outline the terms and conditions under which mutual aid will be provided
- Hazard-specific action plans and Incident Command System position checklists

In addition, the Water Authority's ICP uses a step-by-step approach to emergency response planning by providing tools such as resource and information lists, personnel rosters, pertinent policies and procedures, and reference materials. The Water Authority provides input to the Unified San Diego County Emergency Services Organization's *Operational Area Emergency Operations Plan* (Unified San Diego County Emergency Services Organization and County of San Diego, 2014), which in turn supports the Water Authority's ICP.

11.2.2 Emergency Storage Project

The ESP is a system of reservoirs, pipelines, pump stations, and other conveyance facilities intended to improve the San Diego region's water storage capacity, and to allow stored emergency water to be delivered to the Water Authority's member agencies in the County during a prolonged regional interruption. The Water Authority's ESP facilities can be used to help deliver emergency water supply to member agencies during two- and six-month emergency events in which the County may not be able to receive regular imported water deliveries from Metropolitan due to an event that renders their transmission system inoperable.

A regional emergency event is a catastrophic interruption of imported water supplies, or any other emergency in which the Water Authority has insufficient water available to supply at least 75% of the total demand of its service area, or any portion thereof. The Water Authority Board may also authorize use of water stored for emergencies under the ESP during a prolonged drought or other water shortage situation where imported and local supplies do not meet the 75% level of service to member agencies. The regional emergency water supply reservoirs (with their ESP capacity) are as follows:

- Olivenhain Reservoir (18,000 AF)
- Lake Hodges Reservoir (20,000 AF)
- San Vicente Reservoir (52,100 AF)

The actual amount of ESP water that would be delivered to a particular member agency during an emergency event would depend on many factors, including member agency demand, local supply, parts of the ESP infrastructure and other Water Authority infrastructure in place, availability of supplies from Metropolitan, and the actual duration of the emergency. Overall,

the ESP was designed to create a regional water storage capacity of 90,100 AF to meet emergency needs through at least 2045.

The ESP storage and conveyance facilities include the following:

- Olivenhain Reservoir
- Olivenhain Pipeline and Pump Station
- Lake Hodges Pipeline and Pump Station
- San Vicente Reservoir Dam Raise
- San Vicente Pipeline and Pump Station

These ESP facilities will allow untreated water to be delivered to member agency treatment plants and the Water Authority's Twin Oaks Valley WTP, which in turn will provide treated water to all member agency customers during an emergency event. The final ESP components to be built will be ESP pump stations and associated conveyance facilities that will be capable of delivering treated water from the Water Authority's Twin Oaks Valley WTP to the most northern member agencies consisting of Yuima MWD and portions of Valley Center MWD, Fallbrook PUD, and Rainbow MWD. The estimated completion date for the Valley Center MWD and Yuima MWD ESP facilities is late 2023. The Fallbrook PUD and Rainbow MWD ESP facilities have been deferred pending resolution and outcome of their detachment applications submitted in March 2020 to the San Diego Local Agency Formation Commission.

In sizing the ESP, the Water Authority calculated necessary storage capacities required to provide member agencies with a 75% level of service during a two- or six-month emergency event, after taking into account other supplies available to its member agencies. The level of service is the ratio of all supplies available to a member agency to the net demand of the member agency. The two- and six-month emergency events formed the basis for planning, design, construction, and operation of ESP facilities.

Completion of the Water Authority's Twin Oaks Valley WTP in 2008 increased the Water Authority's ability to treat emergency water supplies delivered from Olivenhain and Lake Hodges Reservoirs. Prior to construction of the Twin Oaks Valley WTP, many member agencies that normally receive treated water from the Water Authority would receive untreated water during a two-month emergency event. In addition, untreated water would have to be conveyed in several treated water pipelines, resulting in the need for decontamination of the treated water pipelines prior to switching back to treated water deliveries. The construction of the Twin Oaks Valley WTP now allows the Water Authority to deliver treated water to its treated water customers during a two-month emergency event, and eliminates the need to convey untreated water in treated water pipelines. Additionally, completion of the Carlsbad Desalination Plant now allows the Water Authority to deliver additional treated water supply to member agencies during emergency events. This results in a commensurate decrease in emergency storage that must be maintained in ESP reservoirs, and decreases the burden on the Twin Oaks Valley WTP, especially during a two-month emergency event.

The following general procedures from the January 2013 *Emergency Water Delivery Plans* (Water Authority, 2013) shows the methodology for calculating the allocation of ESP supplies to member agencies during a prolonged outage without access to imported supplies:

1. Define the water storage and conveyance facility infrastructure that would be in place at the time of the emergency event in order to estimate duration of emergency (i.e., time needed to repair damaged pipelines and/or infrastructure).
2. Determine the total demand of each member agency during the emergency, considering both M&I and agricultural demands.
3. Determine the net demand of each member agency, considering the availability of recycled water supplies.
4. Determine the local supplies available to each member agency from groundwater and surface water storage.
5. Determine the amount of local water that could be transferred within City of San Diego service areas, and between member agencies.
6. Determine the amount of Carlsbad Desalination Plant supplies that could be delivered to member agencies.
7. Determine the amount of imported water supplies from Metropolitan available to deliver to member agencies.
8. Allocate ESP supplies in Olivenhain, Lake Hodges, and San Vicente Reservoirs to each member agency to achieve an initial level of service of 75%, considering other supplies available to each member agency as described above and taking into account limitations of delivery facilities.
9. Determine reductions in member agency deliveries due to the influence of the Water Authority's Permanent Special Agricultural Water Rate (PSAWR) Program. The cutback rate for PSAWR Program customers is twice the rate imposed on Water Authority M&I customers, up to a 90% cutback. Reductions in deliveries that arise from such a cutback would be reallocated to commercial and industrial customers.
10. Determine increases in member agency deliveries due to redistribution of the emergency water not delivered to member agencies as a result of the PSAWR Program.
11. Determine net Water Authority deliveries to member agencies from all water supply sources available to the Water Authority, consisting of Carlsbad Desalination Plant supplies, imported water supplies from Metropolitan, and ESP reservoir supplies.

11.3 Water Shortage Contingency Plan

The WSCP serves as the San Diego region's guiding shortage management document. This section includes information on the history of the Water Authority's drought planning documents, the process to prepare an annual water supply and demand assessment, the shortage supply matrix and response level triggers, the supply allocation methodology, and model drought response ordinance. The complete WSCP can be found in Appendix E.

11.3.1 Background

In 2006, the Water Authority Board approved the *Drought Management Plan* (DMP) (Water Authority, 2006). The DMP outlined a series of orderly, progressive steps for the Water Authority and its member agencies to take during shortages to minimize impacts to the San Diego region's economy and quality of life. It also included an allocation methodology to equitably allocate water supplies to the member agencies. The DMP was activated just a year later in response to Metropolitan drawing water from storage to meet demands, and was deactivated in 2011 when supply conditions improved.

In 2008, the Water Authority Board approved another drought management document, the *Model Drought Response Conservation Program Ordinance* (Model Drought Ordinance). The Model Drought Ordinance focused on core water use restrictions and was intended to help member agencies when updating or drafting local drought response ordinances, and to provide regional consistency in drought response levels and messaging to the public and media. Also in 2008, the Board adopted Resolution 2008-11 that established procedures to administer the supply allocation methodology contained in the DMP.

Using lessons from previous shortage periods, in 2012, the DMP's supply allocation methodology was updated and the DMP was renamed the *Water Shortage and Drought Response Plan* (WSDRP) (Water Authority, 2012). In 2014, the WSDRP was activated due to critically dry weather in California and the impact on water supply conditions. The WSDRP was deactivated in 2016 when supply conditions improved. In each instance when the DMP and WSDRP were activated, a smooth transition into and out of water allocations for the Water Authority's member agencies was possible due to the advanced planning efforts of the Water Authority and its member agencies. Those planning efforts also resulted in a framework that allowed for regional consistency in public drought messaging.

To ensure that the Water Authority and its member agencies continued to proactively plan for future water supply shortages in a manner consistent with anticipated legislation, the Water Authority revised its WSDRP and renamed it the WSCP (Water Authority, 2017) in 2017. The revisions were consistent with the long-term framework contained in DWR's *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16* (DWR, 2017), and with the provisions later codified in the Water Code in 2018 through the passage of SB 606 and AB 1668. Because the Water Authority's WSCP was prepared in 2017 in anticipation of the requirements that were added to the Water Code in 2018, only non-substantive updates to the WSCP were needed in 2021 to meet the requirements of the Act. Additional background information can be found in Sections 2 and 3 of the WSCP.

11.3.2 Annual Water Supply and Demand Assessment

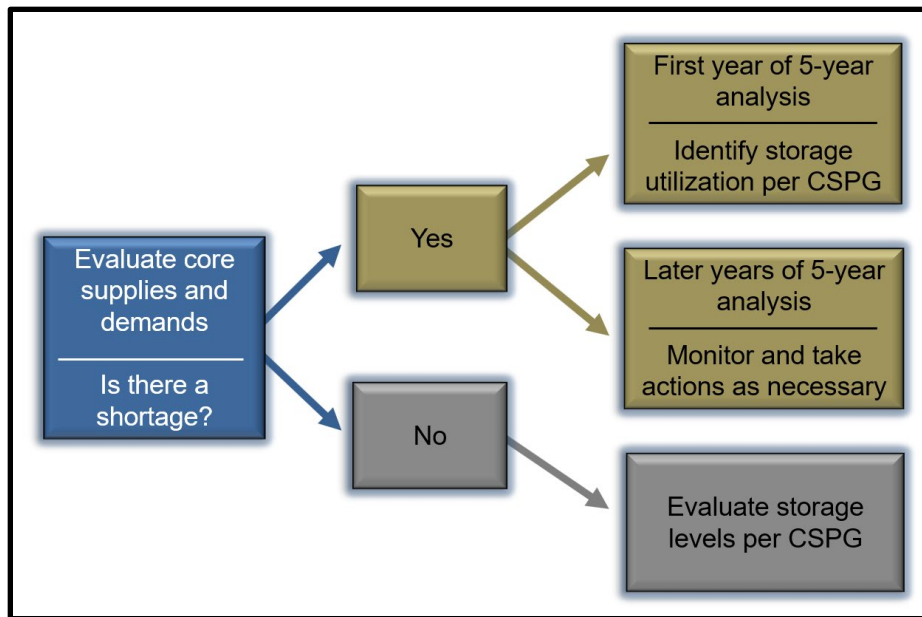
The information below provides an overview of the process for the annual assessment to evaluate the Water Authority's M&I supplies and projected water demands. The assessment is used to determine if there is a shortfall in Water Authority supplies for the current year and one dry year. If the assessment identifies a shortfall in Water Authority supplies, the supplies available could be allocated based on the allocation methodology described below in *Section 11.3.3 Shortage Supply Matrix and Response Level Triggers*. A detailed description of the assessment is included in the WSCP (Section 4.1).

The Water Authority first considers its core water supplies as part of the annual assessment. Those core supplies include water supplies from the Lewis Carlsbad Desalination Plant, the QSA, and MWD. Information on these supplies is included in *Section 4 Water Authority Supplies*. Included as part of consideration of the core supplies are the capabilities and constraints of the infrastructure used to deliver the core water supplies.

Next, the Water Authority considers member agency projected water demands on the Water Authority. Demand for water in the Water Authority's service area falls into two classes of service: M&I and PSAWR demand. The annual assessment considers only M&I water use, which encompasses a wide range of water uses, including residential demand (water used for human consumption in the home, domestic purposes, and outdoor residential landscaping) and water used for commercial, industrial, and institutional (CII) purposes. To project M&I water demands, the Water Authority uses a short-term forecast model that considers multiple variables, including historic water demand patterns, weather, local economic index, and anticipated conservation levels. Demand on the Water Authority is also influenced by member agency local supply levels which may be influenced by weather and other factors.

If a water supply shortfall is identified based on the assessment of core water supplies and projected water demands, the next step is to evaluate the use of stored water reserves from the Water Authority's Carryover Storage reserves or to pursue additional supply augmentation measures, such as dry-year transfers, to reduce or eliminate the shortfall. If a shortage does not exist, consistent with the Carryover Storage Policy Guidelines, the Water Authority will analyze how to most effectively manage storage supplies to avoid potential shortages in the future. Figure 11-1 provides an overview of the process to perform the annual water supply and demand assessment.

Figure 11-1. Assessment Process Overview



CSPG = Carryover Storage Policy Guidelines

11.3.3 Shortage Supply Matrix and Response Level Triggers

In times of potential water supply shortages, the Water Authority needs to take actions to try to reduce and eliminate the shortage. The Shortage Response Matrix provides guidance to the Board to select potential regional actions to lessen the existing or future severity of water supply shortages. The matrix includes a list of potential shortage response actions available to the Water Authority at each of the six levels. The six levels and percent reductions are consistent with the six levels required under SB 606. The Shortage Supply Matrix is shown as Table 11-1.

The reduction levels are defined as “up to” or “above” a specified percentage to provide more flexibility for the member agencies to establish the appropriate local reduction level should their reduction not equate exactly to the regional number. It should be noted that the regional percent reduction may differ slightly from a member agency’s regional percent reduction depending on the amount of local supplies available to that member agency.

Table 11-1. Shortage Supply Matrix

Regional Water Shortage Levels ²	Potential Water Authority M&I Shortage Response Actions ¹					
	Ongoing Water Use Efficiency	Communication Plan	Supply Augmentation		Call for Extraordinary Demand Reduction Measures	Member Agency M&I Supply Allocation
			Storage Withdrawals	Spot Transfers, Other		
Normal Conditions	✓					
<u>Level 1</u> Up to 10% (Voluntary)	✓	✓	✓			
<u>Level 2</u> Up to 20% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 3</u> Up to 30% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 4</u> Up to 40% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 5</u> Up to 50% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 6</u> Above 50% (Mandatory)	✓	✓	✓	✓	✓	✓

¹ The matrix contains potential Water Authority regional actions. The member agencies can implement local jurisdiction regulations as necessary for their service areas.

² The response to a catastrophic emergency could occur under any response level. Potential Water Authority shortage response actions include activation of the Integrated Contingency Plan and allocation of Emergency Storage Program supplies.

To determine the specific actions that should be taken at each level, the Water Authority and its member agencies evaluate conditions specific to the timing, supply availability, cost, and other pertinent variables. Numerous variables can influence the supply reduction levels during a water supply shortage. These variables include, but are not limited to, SWP allocation, conditions on the Colorado River, Water Authority supplies, local storage, local demands, and timing. Member agencies will independently adopt retail-level actions to manage potential water supply shortages.

Depending on the situation, the Board may not implement each of the identified actions in a response level, but select only those that are appropriate. For example, at Level 2, the matrix lists six actions the Board could consider adopting, but based on local and statewide supply conditions, would only decide to implement four of the actions. In addition, the Board may adopt additional actions not listed in the matrix. This occurred during the 2014-2017 statewide drought, when the SWRCB instituted emergency conservation mandates for urban retail water

suppliers statewide, regardless of local supply conditions. In the future, should the state mandate emergency conservation standards that would require the Water Authority to deviate from the process outlined in the WSCP, extensive collaboration would occur with the member agencies to develop recommended regional actions for Water Authority Board consideration.

Response level triggers vary depending on whether the regional water shortage response stage is voluntary or mandatory. For the voluntary level, the scenarios that could trigger a response include the likelihood of potential core supply shortages in the near-term or a shortage in core supplies that could be mitigated through carryover storage reserves. For mandatory levels, a potential scenario that could trigger a response is inadequate Water Authority core supplies to meet demands and supply augmentation does not fully mitigate a core supply shortage. In addition, the response to a catastrophic emergency could occur under any response level. The potential scenarios are summarized in Table 11-2. Section 5 of the WSCP contains information on regional shortage response actions, levels, and triggers.

Table 11-2. Potential Response Level Triggers

Regional Water Shortage Response – M&I Demand Reduction Level		Scenarios (As Documented in Reliability Analysis)
Voluntary	Level 1 – Up to 10%	<ul style="list-style-type: none"> Likelihood of potential core supply shortage in the near-term Shortage in core supplies, but mitigated through carryover storage reserves
Mandatory	Level 2 – Up to 20%	<ul style="list-style-type: none"> Water Authority core supplies are not adequate to meet member agency demands Supply augmentation (i.e., utilize storage reserves and/or dry-year transfers)
	Level 3 – Up to 30%	
	Level 4 – Up to 40%	
	Level 5 – Up to 50%	
	Level 6 – Above 50%	
Catastrophic Emergency		<ul style="list-style-type: none"> Occurs when a disaster, such as an earthquake or other emergency event, results in insufficient available water to meet the region’s needs or eliminates access to imported water supplies

11.3.4 Water Authority Supply Allocation Methodology

In the event of mandatory supply cutbacks from Metropolitan, the WSCP includes an M&I allocation methodology to determine how the Water Authority’s available supplies will be equitably allocated to its member agencies. The M&I allocation methodology applies to those customers paying the M&I rate, including residential, commercial, and industrial customers. During an allocation, the actual reduction in member agency deliveries is determined through a comparison of the member agency’s monthly meter reads and the allocation target for the member agency. This tracking information is then provided in monthly progress reports to the Water Authority’s board of directors. The complete allocation methodology can be found in Section 8 of the WSCP (Appendix E).

The Water Authority administers the M&I allocation methodology following the procedures and policies contained in the Water Authority’s Resolution Establishing Procedures and Policies for Administration of the Water Shortage Contingency Plan Water Supply Allocation Methodology. A copy of the resolution is included in Appendix D of the WSCP. The resolution includes a requirement for the Water Authority staff to report monthly to the Board and member agency managers on how agency deliveries are tracking compared to their allocation target.

A separate process is used to allocate deliveries under the PSAWR Program, where the supply allocations are based on Metropolitan’s cutback level to the Water Authority and Water Authority regional supplies are not available to mitigate the cutback. Under this process, PSAWR Program demands are met through the supplies allocated from Metropolitan and are not supplemented with the Water Authority’s regional supplies from Colorado River Transfers, the Carlsbad Desalination Plant, any carryover storage water, or potential dry water year supplies.

11.3.5 Model Drought Response Conservation Ordinance

The WSCP includes a Model Drought Ordinance for use by member agencies to update their existing ordinances. The Model Drought Ordinance, initially developed with input from the member agencies in 2008 and updated as part of the process to prepare the 2020 UWMP, is used to provide regional consistency during periods of shortages. It identifies six drought response levels that contain water-use restrictions to help achieve demand reductions during temporary shortages. The restrictions become more stringent at each successive level to obtain necessary savings and delay economic impact until higher levels. The Model Drought Ordinance is included in Appendix B of the WSCP. Table 11-3 shows the correlation between the Model Drought Ordinance response levels and WSCP shortage levels.

Table 11-3. Correlation between Model Drought Ordinance Response/WSCP Shortage Levels

Drought Ordinance Response/WSCP Shortage Levels	Use Restrictions	Conservation Target
1	Voluntary	Up to 10%
2	Mandatory	Up to 20%
3	Mandatory	Up to 30%
4	Mandatory	Up to 40%
5	Mandatory	Up to 50%
6	Mandatory	Above 50%

11.4 Water Authority Dry Water Year Supplies and Carryover Storage

The Water Authority's dry water year supplies and carryover storage are important components of managing potential shortages within the region and for increasing supply reliability. The dry water year supplies help to minimize or reduce potential supply shortages from Metropolitan. The Water Authority has developed the Carryover Storage Program (CSP) to more effectively manage supplies, which includes in-region surface storage at San Vicente Reservoir. The Water Authority also has an out-of-region groundwater banking program in the California Central Valley. Through these efforts, the Water Authority can store water available during wet periods for use during times of shortage. The Water Authority's carryover storage and dry water year transfer programs are discussed below.

11.4.1 Water Authority Carryover Storage Program

The CSP provides water for the region in the case of a supply shortage, such as during a drought. The Water Authority has identified three main needs for carryover storage as follows:

- Enhance reliability of the water supply: During dry weather periods, increased regional demand for water may exceed available supplies, resulting in potential water shortages. Carryover storage provides a reliable and readily available source of water during periods of shortage, such as during dry years.
- Increase system efficiency: Carryover storage provides operational flexibility to serve above normal demands, such as those occurring during peak summer months or extended droughts, from locally stored water rather than by the oversizing the Water Authority's imported water transmission facilities.
- Better management of water supplies: Carryover storage allows the Water Authority to accept additional deliveries from its existing State Water Project- and Colorado River-derived sources during periods of greater availability, such as during wet years, to increase water availability locally during periods of shortage, such as during dry years.

11.4.2 San Vicente Dam Raise Carryover Storage Project

The Water Authority's *Water Facilities Master Plan* (Water Authority, 2002) identified a need for approximately 100,000 AF of carryover storage to assist in maintaining a secure and reliable supply for the region. The San Vicente Dam Raise CSP meets this need by providing approximately 100,000 AF of local storage capacity, facilitating the reliable and efficient delivery of water to residents of the Water Authority service area. It is located in the San Vicente Reservoir above the reservoir expansion for the ESP (see previous *Section 11.2.2 Emergency Storage Project*), increasing water storage reliability for the region. Construction was completed in 2014, and in June 2016 the carryover pool of 100,000 AF was full.

11.4.3 Water Authority's Out-Of-Region Groundwater Program

In 2008, the Water Authority acquired 70,000 AF of permanent storage allocation in the Semitropic-Rosamond Water Bank Authority and the Semitropic Water Bank (40,000 AF and 30,000 AF, respectively) located in Kern County. Due to its location near the California Aqueduct, the Kern River and the Friant-Kern Canal, the location was ideally suited for groundwater banking. The Water Authority's assigned rights included a total program put capacity of 9,381 AF per year and 14,200 AF per year of take capacity. Due to statewide dry conditions, in 2008, the Water Authority acquired approximately 16,117 AF of water, which continues to be stored in the Water Authority's out-of-region banking program.

11.4.4 Utilization of Carryover Storage Supplies

In accordance with the Water Authority's WSCP, potential use of carryover storage supplies could occur in Levels 1-6. The amount of water taken from carryover storage reserves, to manage potential shortages, is influenced by a number of factors and should generally be handled on a case-by-case basis. Many of the factors the influence the storage take will vary depending upon conditions present. These factors include:

- Current water demand trends
- Core water supply availability from imported and local sources
- Existing and projected hydrologic conditions
- Storage supply available for withdrawal
- Take capacity from the groundwater banking program
- Need to avoid depletion of storage reserves

For planning purposes in the 2020 UWMP, general guidelines consistent with previous Water Authority planning documents established that approximately one-fifth of the carryover supplies available in storage will be used in one year. Using only a portion of available storage supplies avoids depletion of storage reserves, thereby making water available for potential ongoing or future shortages. Carryover storage takes shown in the dry water year assessments in *Section 9 Water Supply Reliability* are used for planning purposes only and do not dictate future carryover storage takes. The supplies taken from carryover storage will be considered a Water Authority regional supply to be combined with the Water Authority's core supplies and any potential dry water year transfers.

Another factor that will be considered when utilizing carryover supplies is participation in the Water Authority's PSAWR Program. Customers in the PSAWR Program are exempt from paying the Water Authority's storage charge and in turn receive no water from the CSP. In September 2020, the Water Authority Board adopted an ordinance that established the PSAWR Program beginning in January 2021.

11.4.5 Water Authority's Dry-Year Transfer Program

To ensure adequate water supplies during drought conditions and periods of regulatory constraints, the Water Authority may consider securing water transfers as part of its WSCP. Considerations about whether to pursue transfers are based on a range of factors such as source location, federal and state agency approvals, price, call period, and capacity in the State Water Project system.

In 2009, to reduce the impact of shortages during the 2007–2011 drought, the Water Authority acquired 20,000 AF of water under a one-year transfer agreement with Placer County Water Agency in Northern California. The transfer eased the San Diego region's transition from voluntary conservation to mandatory water-use restrictions by keeping the regional water savings target for the year at a manageable level.

The Water Authority did not pursue transfers during the 2012–2016 drought for a number of reasons, including limited availability of transfers, high cost, and the ability of the Water Authority and the member agencies to manage the drought with the current available supplies. In addition, securing dry water year transfers with the SWRCB May 2015 emergency regulation in place would not have alleviated the state-mandated cutback levels. Supply availability was not taken into account when the state established the reduction mandates.

11.5 Penalties for Excessive Water Use

Penalty rates may be used by the Water Authority to encourage conservation and reduce demand during a drought or other water supply shortage. If Metropolitan allocates imported water supplies to the Water Authority, Metropolitan can impose surcharges (i.e., penalty pricing) on water consumption in excess of the Water Authority's allocation. The Water Authority's Implementing Resolution provides for a pass through to the Water Authority's member agencies of any penalties levied by Metropolitan on the Water Authority for exceeding its annual allocation. Penalties are assessed at the end of the fiscal year, on a pro rata basis to the member agencies that exceed their allocations. The Water Authority is subject to significant financial penalties if it exceeds its Metropolitan allocation.

Rates may also be adjusted based on any other allocation program implemented by the Water Authority as determined necessary by the Board. The Water Authority may also reduce the amount of water it allocates to a member agency if the member agency fails to adopt or implement water-use restrictions.

11.6 Revenue Impacts

The Water Authority has taken significant steps to reduce potential revenue impacts resulting from fluctuating water sales. In fiscal year 1990, the Water Authority created a rate stabilization fund to mitigate the need for rate increases in the event of an unexpected decline in water sales. In 2006 and again in 2018, the Board adopted new policies governing the rate stabilization fund. Under the policy, the rate stabilization fund has a target balance that is the

equivalent of the estimated financial impact of 2.5 years of wet weather (i.e., reduced sales). The policy also established a maximum rate stabilization fund balance equal to the financial impact of 3.5 years of wet weather. The policy matches the level of funding with risk (i.e., water sales volatility) that the fund is designed to mitigate. The rate stabilization fund provides an important tool to mitigate water sales volatility and the impact that has on water rates.

On January 1, 2003, the Water Authority implemented a rate structure that substantially increased the percentage of water revenues generated from fixed charges. This increase replaced the previous variable postage stamp rate, which historically generated as much as 80% or more of total annual revenues, with two fixed charges, and one variable rate. The new fixed charges, Customer Service and Storage combined with the Infrastructure Access Charge, provide the Water Authority with enhanced revenue stability. Additionally, in March 2015, the Board adopted the new fixed Supply Reliability Charge. The Supply Reliability Charge recovers a portion of the Carlsbad Desalination Plant water purchase and Imperial Irrigation District water transfer supply costs. The fixed charges combined help to mitigate revenue volatility due to changes in either water demand or supply availability and support smooth and predictable rates and charges. As part of the Water Authority's annual rate setting process, the split between fixed and variable revenues is continuously assessed and adjusted to ensure appropriate cost-recovery.

Although the Water Authority maintains strong financial reserves, it is possible that additional loss of revenue associated with demand reduction or costs associated with supply enhancement could negatively affect the Water Authority's short-term financial situation. The Water Authority may compensate for increased costs or reduced water sales by adjusting water rates in succeeding years.

11.7 References

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Public Review Draft

2020 Urban Water Management Plan *Appendices*

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Appendix A: California Water Code Changes

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Appendix B. Changes to the California Water Code Since 2015 UWMP

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

This document presents changes made to Water Code statutes that appeared in the 2015 Urban Water Management Plan Guidebook and it includes updated Water Code statutes (as of January 1, 2020). The information presented focuses on Water Code sections affecting urban water suppliers and the California Department of Water Resources (DWR), as compiled by DWR staff.

- Section 10608 – 10608.44
- Section 10609 – 10609.38
- Sections 10610 – 10657

[Note to reader: ~~Strikeouts~~-indicated text removed from the 2015 version while *italic* text represents new language since 2015.]

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 – 10609.42]

CHAPTER 1. General Declarations and Policy [10608 – 10608.8]

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

- (a) Water is a public resource that the California Constitution protects against waste and unreasonable use.
- (b) Growing population, climate change, and the need to protect and grow California's economy while protecting and restoring our fish and wildlife habitats make it essential that the state manage its water resources as efficiently as possible.
- (c) Diverse regional water supply portfolios will increase water supply reliability and reduce dependence on the Delta.
- (d) Reduced water use through conservation provides significant

energy and environmental benefits, and can help protect water quality, improve streamflows, and reduce greenhouse gas emissions.

- (e) The success of state and local water conservation programs to increase efficiency of water use is best determined on the basis of measurable outcomes related to water use or efficiency.
- (f) Improvements in technology and management practices offer the potential for increasing water efficiency in California over time, providing an essential water management tool to meet the need for water for urban, agricultural, and environmental uses.
- (g) The Governor has called for a 20 percent per capita reduction in urban water use statewide by 2020.
- (h) The factors used to formulate water use efficiency targets can vary significantly from location to location based on factors including weather, patterns of urban and suburban development, and past efforts to enhance water use efficiency.
- (i) Per capita water use is a valid measure of a water provider's efforts to reduce urban water use within its service area. However, per capita water use is less useful for measuring relative water use efficiency between different water providers. Differences in weather, historical patterns of urban and suburban development, and density of housing in a particular location need to be considered when assessing per capita water use as a measure of efficiency.

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

- (a) Require all water suppliers to increase the efficiency of use of this essential resource.
- (b) Establish a framework to meet the state targets for urban water conservation identified in this part and called for by the Governor.
- (c) Measure increased efficiency of urban water use on a per capita basis.
- (d) Establish a method or methods for urban retail water suppliers to determine targets for achieving increased water use efficiency by the year 2020, in accordance with the Governor's goal of a 20-percent reduction.

- (e) Establish consistent water use efficiency planning and implementation standards for urban water suppliers and agricultural water suppliers.
- (f) Promote urban water conservation standards that are consistent with the California Urban Water Conservation Council's adopted best management practices and the requirements for demand management in Section 10631.
- (g) Establish standards that recognize and provide credit to water suppliers that made substantial capital investments in urban water conservation since the drought of the early 1990s.
- (h) Recognize and account for the investment of urban retail water suppliers in providing recycled water for beneficial uses.
- (i) Require implementation of specified efficient water management practices for agricultural water suppliers.
- (j) Support the economic productivity of California's agricultural, commercial, and industrial sectors.
- (k) Advance regional water resources management.

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

- (2) Because an urban agency is not required to meet its urban water use target until 2020 pursuant to subdivision (b) of Section 10608.24, an urban retail water supplier's failure to meet those targets shall not establish a violation of law for purposes of any state administrative or judicial proceeding prior to January 1, 2021. Nothing in this paragraph limits the use of data reported to the department or the board in litigation or an administrative proceeding. This paragraph shall become inoperative on January 1, 2021.
 - (3) To the extent feasible, the department and the board shall provide for the use of water conservation reports required under this part to meet the requirements of Section 1011 for water conservation reporting.
- (b) This part does not limit or otherwise affect the application of Chapter 3.5 (commencing with Section 11340), Chapter 4

(commencing with Section 11370), Chapter 4.5 (commencing with Section 11400), and Chapter 5 (commencing with Section 11500) of Part 1 of Division 3 of Title 2 of the Government Code.

- (c) This part does not require a reduction in the total water used in the agricultural or urban sectors, because other factors, including, but not limited to, changes in agricultural economics or population growth may have greater effects on water use. This part does not limit the economic productivity of California's agricultural, commercial, or industrial sectors.
- (d) The requirements of this part do not apply to an agricultural water supplier that is a party to the Quantification Settlement Agreement, as defined in subdivision (a) of Section 1 of Chapter 617 of the Statutes of 2002, during the period within which the Quantification Settlement Agreement remains in effect. After the expiration of the Quantification Settlement Agreement, to the extent conservation water projects implemented as part of the Quantification Settlement Agreement remain in effect, the conserved water created as part of those projects shall be credited against the obligations of the agricultural water supplier pursuant to this part.

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 – 10609.42]

CHAPTER 2. Definitions [10608.12 – 10608.12.]

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

- (a) "Agricultural water supplier" means a water supplier, either publicly or privately owned, providing water to 10,000 or more irrigated acres, excluding recycled water. "Agricultural water supplier" includes a supplier or contractor for water, regardless of the basis of right, that distributes or sells water for ultimate resale to customers. "Agricultural water supplier" does not include the department.
- (b) "Base daily per capita water use" means any of the following:
 - (1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier

than December 31, 2004, and no later than December 31, 2010.

- (2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.
 - (3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.
- (c) "Baseline commercial, industrial, and institutional water use" means an urban retail water supplier's base daily per capita water use for commercial, industrial, and institutional users.
 - (d) *"CII water use" means water used by commercial water users, industrial water users, institutional water users, and large landscape water users.*
 - (e) "Commercial water user" means a water user that provides or distributes a product or service.
 - ~~(e)~~(f) "Compliance daily per capita water use" means the gross water use during the final year of the reporting period, reported in gallons per capita per day.
 - ~~(f)~~(g) "Disadvantaged community" means a community with an annual median household income that is less than 80 percent of the statewide annual median household income.
 - ~~(g)~~(h) "Gross water use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:
 - (1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier.
 - (2) The net volume of water that the urban retail water supplier places into long-term storage.

- (3) The volume of water the urban retail water supplier conveys for use by another urban water supplier.
- (4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.
- ~~(h)~~(i) "Industrial water user" means a water user that is primarily a manufacturer or processor of materials as defined by the North American Industry Classification System code sectors 31 to 33, inclusive, or an entity that is a water user primarily engaged in research and development.
- ~~(i)~~(j) "Institutional water user" means a water user dedicated to public service. This type of user includes, among other users, higher education institutions, schools, courts, churches, hospitals, government facilities, and nonprofit research institutions.
- ~~(j)~~(k) "Interim urban water use target" means the midpoint between the urban retail water supplier's base daily per capita water use and the urban retail water supplier's urban water use target for 2020.
- ~~(k)~~(l) *"Large landscape" means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.*
- (m) "Locally cost effective" means that the present value of the local benefits of implementing an agricultural efficiency water management practice is greater than or equal to the present value of the local cost of implementing that measure.
- (n) *"Performance measures" means actions to be taken by urban retail water suppliers that will result in increased water use efficiency by CII water users. Performance measures may include, but are not limited to, educating CII water users on best management practices, conducting water use audits, and preparing water management plans. Performance measures do not include process water.*
- (o) *"Potable reuse" means direct potable reuse, indirect potable reuse for groundwater recharge, and reservoir water augmentation as those terms are defined in Section 13561.*
- (p) "Process water" means water used by industrial water users for producing a product or product content or water used for research and development, ~~including~~, but not limited to, continuous

manufacturing processes, water used for testing and maintaining equipment ~~used in producing a~~. *Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product or quality or chemical characteristics for product content, and water used in combined heat and power facilities used in producing a product or product content.* *manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water.* Process water does not mean incidental water ~~uses not related to the production of a product or product content, including, but not limited to, water used for~~ restrooms, landscaping, air conditioning, heating, kitchens, and laundry.

- ~~(m)~~ (q) "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050 ~~that is used to offset potable demand, including recycled water supplied for direct use and indirect potable reuse, that meets the following requirements, where applicable:~~
- ~~(1) For groundwater recharge, including recharge through spreading basins, water supplies that are all of the following:~~
 - ~~(A) Metered.~~
 - ~~(B) Developed through planned investment by the urban water supplier or a wastewater treatment agency.~~
 - ~~(C) Treated to a minimum tertiary level.~~
 - ~~(D) Delivered within the service area of an urban retail water supplier or its urban wholesale water supplier that helps an urban retail water supplier meet its urban water use target.~~
 - ~~(2) For reservoir augmentation, water supplies that meet the criteria of paragraph (1) and are conveyed through a distribution system constructed specifically for recycled water.~~
- ~~(n)~~ (r) "Regional water resources management" means sources of supply resulting from watershed-based planning for sustainable

local water reliability or any of the following alternative sources of water:

- (1) The capture and reuse of stormwater or rainwater.
- (2) The use of recycled water.
- (3) The desalination of brackish groundwater.
- (4) The conjunctive use of surface water and groundwater in a manner that is consistent with the safe yield of the groundwater basin.

~~(e)~~(s) "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

~~(p)~~(t) "Urban retail water supplier" means a water supplier, either publicly or privately owned, that directly provides potable municipal water to more than 3,000 end users or that supplies more than 3,000 acre-feet of potable water annually at retail for municipal purposes.

~~(e)~~(u) "*Urban water use objective*" means an estimate of aggregate efficient water use for the previous year based on adopted water use efficiency standards and local service area characteristics for that year, as described in Section 10609.20.

(v) "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

~~(r)~~(w) "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 – 10609.42]

CHAPTER 3. Urban Retail Water Suppliers [10608.16 – 10608.44]

10608.16. (a) The state shall achieve a 20-percent reduction in urban per capita water use in California on or before December 31, 2020.

(b) The state shall make incremental progress towards the state target specified in subdivision (a) by reducing urban per capita water use by at least 10 percent on or before December 31, 2015.

10608.20. (a) (1) Each urban retail water supplier shall develop urban water use targets and an interim urban water use target by July 1, 2011. Urban retail water suppliers may elect to determine and report progress toward achieving these targets on an individual or regional basis, as provided in subdivision (a) of Section 10608.28, and may determine the targets on a fiscal year or calendar year basis.

(2) It is the intent of the Legislature that the urban water use targets described in paragraph (1) cumulatively result in a 20-percent reduction from the baseline daily per capita water use by December 31, 2020.

(b) An urban retail water supplier shall adopt one of the following methods for determining its urban water use target pursuant to subdivision (a):

(1) Eighty percent of the urban retail water supplier's baseline per capita daily water use.

(2) The per capita daily water use that is estimated using the sum of the following performance standards:

(A) For indoor residential water use, 55 gallons per capita daily water use as a provisional standard. Upon completion of the ~~department's 2016~~ department's 2017 report to the Legislature pursuant to Section 10608.42, this standard may be adjusted by the Legislature by statute.

(B) For landscape irrigated through dedicated or residential meters or connections, water efficiency equivalent to the standards of the Model Water Efficient Landscape Ordinance set forth in Chapter 2.7 (commencing with Section 490) of Division 2 of Title 23 of the California Code of Regulations, as in effect the later of the year of the landscape's installation or 1992. An urban retail water supplier using the approach specified in this subparagraph shall use satellite imagery, site visits, or other best available technology to develop an accurate estimate of landscaped areas.

(C) For commercial, industrial, and institutional uses, a 10-percent reduction in water use from the baseline commercial, industrial, and institutional water use by

2020.

- (3) Ninety-five percent of the applicable state hydrologic region target, as set forth in the state's draft 20x2020 Water Conservation Plan (dated April 30, 2009). If the service area of an urban water supplier includes more than one hydrologic region, the supplier shall apportion its service area to each region based on population or area.
- (4) A method that shall be identified and developed by the department, through a public process, and reported to the Legislature no later than December 31, 2010. The method developed by the department shall identify per capita targets that cumulatively result in a statewide 20-percent reduction in urban daily per capita water use by December 31, 2020. In developing urban daily per capita water use targets, the department shall do all of the following:
 - (A) Consider climatic differences within the state.
 - (B) Consider population density differences within the state.
 - (C) Provide flexibility to communities and regions in meeting the targets.
 - (D) Consider different levels of per capita water use according to plant water needs in different regions.
 - (E) Consider different levels of commercial, industrial, and institutional water use in different regions of the state.
 - (F) Avoid placing an undue hardship on communities that have implemented conservation measures or taken actions to keep per capita water use low.
- (c) If the department adopts a regulation pursuant to paragraph (4) of subdivision (b) that results in a requirement that an urban retail water supplier achieve a reduction in daily per capita water use that is greater than 20 percent by December 31, 2020, an urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may limit its urban water use target to a reduction of not more than 20 percent by December 31, 2020, by adopting the method described in paragraph (1) of subdivision (b).

- (d) The department shall update the method described in paragraph (4) of subdivision (b) and report to the Legislature by December 31, 2014. An urban retail water supplier that adopted the method described in paragraph (4) of subdivision (b) may adopt a new urban daily per capita water use target pursuant to this updated method.
- (e) An urban retail water supplier shall include in its urban water management plan due in 2010 pursuant to Part 2.6 (commencing with Section 10610) the baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.
- (f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections.
- (g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).
- (h) (1) The department, through a public process and in consultation with the California Urban Water Conservation Council, shall develop technical methodologies and criteria for the consistent implementation of this part, including, but not limited to, both of the following:
 - (A) Methodologies for calculating base daily per capita water use, baseline commercial, industrial, and institutional water use, compliance daily per capita water use, gross water use, service area population, indoor residential water use, and landscaped area water use.
 - (B) Criteria for adjustments pursuant to subdivisions (d) and (e) of Section 10608.24.
- (2) The department shall post the methodologies and criteria developed pursuant to this subdivision on its internet ~~Web~~ *website*, and make written copies available, by October 1, 2010. An urban retail water supplier shall use the methods developed by the department in compliance with this part.

- (i) (1) The department shall adopt regulations for implementation of the provisions relating to process water in accordance with ~~subdivision (f) of~~ Section 10608.12, subdivision (e) of Section 10608.24, and subdivision (d) of Section 10608.26.
 - (2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.
- (j) (1) An urban retail water supplier is granted an extension to July 1, 2011, for adoption of an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) due in 2010 to allow the use of technical methodologies developed by the department pursuant to paragraph (4) of subdivision (b) and subdivision (h). An urban retail water supplier that adopts an urban water management plan due in 2010 that does not use the methodologies developed by the department pursuant to subdivision (h) shall amend the plan by July 1, 2011, to comply with this part.
 - (2) An urban wholesale water supplier whose urban water management plan prepared pursuant to Part 2.6 (commencing with Section 10610) was due and not submitted in 2010 is granted an extension to July 1, 2011, to permit coordination between an urban wholesale water supplier and urban retail water suppliers.

10608.22. Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

10608.24. (a) Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.

- (b) Each urban retail water supplier shall meet its urban water use target by December 31, 2020.
- (c) An urban retail water supplier's compliance daily per capita water use shall be the measure of progress toward achievement of its urban water use target.
- (d) (1) When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors:
 - (A) Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period.
 - (B) Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period.
 - (C) Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period.
- (2) If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.
- (e) When developing the urban water use target pursuant to Section 10608.20, an urban retail water supplier that has a substantial percentage of industrial water use in its service area may exclude process water from the calculation of gross water use to avoid a disproportionate burden on another customer sector.
- (f) (1) An urban retail water supplier that includes agricultural water use in an urban water management plan pursuant to Part 2.6 (commencing with Section 10610) may include the agricultural water use in determining gross water use. An urban retail water supplier that includes agricultural water use in determining gross water use and develops its urban water use target pursuant to paragraph (2) of subdivision (b) of Section 10608.20 shall use a

water efficient standard for agricultural irrigation of 100 percent of reference evapotranspiration multiplied by the crop coefficient for irrigated acres.

- (2) An urban retail water supplier, that is also an agricultural water supplier, is not subject to the requirements of Chapter 4 (commencing with Section 10608.48), if the agricultural water use is incorporated into its urban water use target pursuant to paragraph (1).

10608.26. (a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:

- (1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.
- (2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.
- (3) Adopt a method, pursuant to subdivision (b) of Section 10608.20, for determining its urban water use target.

(b) In complying with this part, an urban retail water supplier may meet its urban water use target through efficiency improvements in any combination among its customer sectors. An urban retail water supplier shall avoid placing a disproportionate burden on any customer sector.

(c) For an urban retail water supplier that supplies water to a United States Department of Defense military installation, the urban retail water supplier's implementation plan for complying with this part shall consider the conservation of that military installation under federal Executive Order 13514.

(d) (1) Any ordinance or resolution adopted by an urban retail water supplier after the effective date of this section shall not require existing customers as of the effective date of this section, to undertake changes in product formulation, operations, or equipment that would reduce process water use, but may provide technical assistance and financial incentives to those customers to implement efficiency measures for process water. This section shall not limit an ordinance or resolution adopted pursuant to a declaration of drought emergency by an urban retail water supplier.

- (2) This part shall not be construed or enforced so as to interfere with the requirements of Chapter 4 (commencing with Section 113980) to Chapter 13 (commencing with Section 114380), inclusive, of Part 7 of Division 104 of the Health and Safety Code, or any requirement or standard for the protection of public health, public safety, or worker safety established by federal, state, or local government or recommended by recognized standard setting organizations or trade associations.

10608.28. (a) An urban retail water supplier may meet its urban water use target within its retail service area, or through mutual agreement, by any of the following:

- (1) Through an urban wholesale water supplier.
 - (2) Through a regional agency authorized to plan and implement water conservation, including, but not limited to, an agency established under the Bay Area Water Supply and Conservation Agency Act (Division 31 (commencing with Section 81300)).
 - (3) Through a regional water management group as defined in Section 10537.
 - (4) By an integrated regional water management funding area.
 - (5) By hydrologic region.
 - (6) Through other appropriate geographic scales for which computation methods have been developed by the department.
- (b) A regional water management group, with the written consent of its member agencies, may undertake any or all planning, reporting, and implementation functions under this chapter for the member agencies that consent to those activities. Any data or reports shall provide information both for the regional water management group and separately for each consenting urban retail water supplier and urban wholesale water supplier.

10608.32. All costs incurred pursuant to this part by a water utility regulated by the Public Utilities Commission may be recoverable in rates subject to review and approval by the Public Utilities Commission, and may

be recorded in a memorandum account and reviewed for reasonableness by the Public Utilities Commission.

10608.34. (a) (1) On or before January 1, 2017, the department shall adopt rules for all of the following:

- (A) The conduct of standardized water loss audits by urban retail water suppliers in accordance with the method adopted by the American Water Works Association in the third edition of Water Audits and Loss Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0.
 - (B) The process for validating a water loss audit report prior to submitting the report to the department. For the purposes of this section, "validating" is a process whereby an urban retail water supplier uses a technical expert to confirm the basis of all data entries in the urban retail water supplier's water loss audit report and to appropriately characterize the quality of the reported data. The validation process shall follow the principles and terminology laid out by the American Water Works Association in the third edition of Water Audits and Loss Control Programs, Manual M36 and in the Free Water Audit Software, version 5.0. A validated water loss audit report shall include the name and technical qualifications of the person engaged for validation.
 - (C) The technical qualifications required of a person to engage in validation, as described in subparagraph (B).
 - (D) The certification requirements for a person selected by an urban retail water supplier to provide validation of its own water loss audit report.
 - (E) The method of submitting a water loss audit report to the department.
- (2) The department shall update rules adopted pursuant to paragraph (1) no later than six months after the release of subsequent editions of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36. Except as provided by the department, until the department adopts updated rules pursuant to this paragraph,

an urban retail water supplier may rely upon a subsequent edition of the American Water Works Association's Water Audits and Loss Control Programs, Manual M36 or the Free Water Audit Software.

~~(b) On or before October 1, 2017, and on or before October~~ (b)

- (1) *On or before October 1 of each year until October 1, 2023, each urban retail water supplier reporting on a calendar year basis shall submit a completed and validated water loss audit report for the previous calendar year or the previous fiscal year as prescribed by the department pursuant to subdivision (a).*
- (2) *On or before January 1 of each year until January 1, 2024, each urban retail water supplier reporting on a fiscal year basis shall submit a completed and validated water loss audit report for the previous fiscal year as prescribed by the department pursuant to subdivision (a).*
- (3) *On or before January 1, 2024, and on or before January 1 of each year thereafter, each urban retail water supplier shall submit a completed and validated water loss audit report for the previous calendar year or the previous fiscal year as part of the report submitted to the department pursuant to subdivision (a) of Section 10609.24 and as prescribed by the department pursuant to subdivision (a).*
- (4) Water loss audit reports submitted on or before October 1, 2017, may be completed and validated with assistance as described in subdivision (c).
- (c) Using funds available for the 2016–17 fiscal year, the board shall contribute up to four hundred thousand dollars (\$400,000) towards procuring water loss audit report validation assistance for urban retail water suppliers.
- (d) Each water loss audit report submitted to the department shall be accompanied by information, in a form specified by the department, identifying steps taken in the preceding year to increase the validity of data entered into the final audit, reduce the volume of apparent losses, and reduce the volume of real losses.

- (e) At least one of the following employees of an urban retail water supplier shall attest to each water loss audit report submitted to the department:
 - (1) The chief financial officer.
 - (2) The chief engineer.
 - (3) The general manager.
- (f) The department shall deem incomplete and return to the urban retail water supplier any final water loss audit report found by the department to be incomplete, not validated, unattested, or incongruent with known characteristics of water system operations. A water supplier shall resubmit a completed water loss audit report within 90 days of an audit being returned by the department.
- (g) The department shall post all validated water loss audit reports on its internet ~~Web site~~ *website* in a manner that allows for comparisons across water suppliers. The department shall make the validated water loss audit reports available for public viewing in a timely manner after their receipt.
- (h) Using available funds, the department shall provide technical assistance to guide urban retail water suppliers' water loss detection programs, including, but not limited to, metering techniques, pressure management techniques, condition-based assessment techniques for transmission and distribution pipelines, and utilization of portable and permanent water loss detection devices.
- (i) No earlier than January 1, 2019, and no later than July 1, 2020, the board shall adopt rules requiring urban retail water suppliers to meet performance standards for the volume of water losses. In adopting these rules, the board shall employ full life-cycle cost accounting to evaluate the costs of meeting the performance standards. The board may consider establishing a minimum allowable water loss threshold that, if reached and maintained by an urban water supplier, would exempt the urban water supplier from further water loss reduction requirements.

10608.35. *(a) The department, in coordination with the board, shall conduct necessary studies and investigations and make a recommendation to the Legislature, by January 1, 2020, on the feasibility of developing and*

enacting water loss reporting requirements for urban wholesale water suppliers.

(b) The studies and investigations shall include an evaluation of the suitability of applying the processes and requirements of Section 10608.34 to urban wholesale water suppliers.

(c) In conducting necessary studies and investigations and developing its recommendation, the department shall solicit broad public participation from stakeholders and other interested persons.

10608.36. Urban wholesale water suppliers shall include in the urban water management plans required pursuant to Part 2.6 (commencing with Section 10610) an assessment of their present and proposed future measures, programs, and policies to help achieve the water use reductions required by this part.

10608.40. Urban water retail suppliers shall report to the department on their progress in meeting their urban water use targets as part of their urban water management plans submitted pursuant to Section 10631. The data shall be reported using a standardized form developed pursuant to Section 10608.52.

10608.42. (a) The department shall review the 2015 urban water management plans and report to the Legislature by July 1, 2017, on progress towards achieving a 20-percent reduction in urban water use by December 31, 2020. The report shall include recommendations on changes to water efficiency standards or urban water use targets to achieve the 20-percent reduction and to reflect updated efficiency information and technology changes.

(b) A report to be submitted pursuant to subdivision (a) shall be submitted in compliance with Section 9795 of the Government Code.

10608.43. The department, in conjunction with the California Urban Water Conservation Council, by April 1, 2010, shall convene a representative task force consisting of academic experts, urban retail water suppliers, environmental organizations, commercial water users, industrial water users, and institutional water users to develop alternative best management practices for commercial, industrial, and institutional users and an assessment of the potential statewide water use efficiency improvement in

the commercial, industrial, and institutional sectors that would result from implementation of these best management practices. The taskforce, in conjunction with the department, shall submit a report to the Legislature by April 1, 2012, that shall include a review of multiple sectors within commercial, industrial, and institutional users and that shall recommend water use efficiency standards for commercial, industrial, and institutional users among various sectors of water use. The report shall include, but not be limited to, the following:

- (a) Appropriate metrics for evaluating commercial, industrial, and institutional water use.
- (b) Evaluation of water demands for manufacturing processes, goods, and cooling.
- (c) Evaluation of public infrastructure necessary for delivery of recycled water to the commercial, industrial, and institutional sectors.
- (d) Evaluation of institutional and economic barriers to increased recycled water use within the commercial, industrial, and institutional sectors.
- (e) Identification of technical feasibility and cost of the best management practices to achieve more efficient water use statewide in the commercial, industrial, and institutional sectors that is consistent with the public interest and reflects past investments in water use efficiency.

10608.44. Each state agency shall reduce water use at facilities it operates to support urban retail water suppliers in meeting the target identified in Section 10608.16.

PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION [10608 – 10609.42]

CHAPTER 4. Agricultural Water Suppliers [10608.48 – 10608.48.]

10608.48. *(a) On or before July 31, 2012, an agricultural water supplier shall implement efficient water management practices pursuant to subdivisions (b) and (c).*

- (b) Agricultural water suppliers shall implement both of the following critical efficient management practices:*

- (1) Measure the volume of water delivered to customers with sufficient accuracy to comply with subdivision (a) of Section 531.10 and to implement paragraph (2).*
 - (2) Adopt a pricing structure for water customers based at least in part on quantity delivered.*
- (c) Agricultural water suppliers shall implement additional efficient management practices, including, but not limited to, practices to accomplish all of the following, if the measures are locally cost effective and technically feasible:*
- (1) Facilitate alternative land use for lands with exceptionally high water duties or whose irrigation contributes to significant problems, including drainage.*
 - (2) Facilitate use of available recycled water that otherwise would not be used beneficially, meets all health and safety criteria, and does not harm crops or soils.*
 - (3) Facilitate the financing of capital improvements for on-farm irrigation systems.*
 - (4) Implement an incentive pricing structure that promotes one or more of the following goals:*
 - (A) More efficient water use at the farm level.*
 - (B) Conjunctive use of groundwater.*
 - (C) Appropriate increase of groundwater recharge.*
 - (D) Reduction in problem drainage.*
 - (E) Improved management of environmental resources.*
 - (F) Effective management of all water sources throughout the year by adjusting seasonal pricing structures based on current conditions.*
 - (5) Expand line or pipe distribution systems, and construct regulatory reservoirs to increase distribution system flexibility and capacity, decrease maintenance, and reduce seepage.*
 - (6) Increase flexibility in water ordering by, and delivery to, water customers within operational limits.*
 - (7) Construct and operate supplier spill and tailwater recovery systems.*

- (8) Increase planned conjunctive use of surface water and groundwater within the supplier service area.*
 - (9) Automate canal control structures.*
 - (10) Facilitate or promote customer pump testing and evaluation.*
 - (11) Designate a water conservation coordinator who will develop and implement the water management plan and prepare progress reports.*
 - (12) Provide for the availability of water management services to water users. These services may include, but are not limited to, all of the following:*
 - (A) On-farm irrigation and drainage system evaluations.*
 - (B) Normal year and real-time irrigation scheduling and crop evapotranspiration information.*
 - (C) Surface water, groundwater, and drainage water quantity and quality data.*
 - (D) Agricultural water management educational programs and materials for farmers, staff, and the public.*
 - (13) Evaluate the policies of agencies that provide the supplier with water to identify the potential for institutional changes to allow more flexible water deliveries and storage.*
 - (14) Evaluate and improve the efficiencies of the supplier's pumps.*
- (d) Agricultural water suppliers shall include in the agricultural water management plans required pursuant to Part 2.8 (commencing with Section 10800) a report on which efficient water management practices have been implemented and are planned to be implemented, an estimate of the water use efficiency improvements that have occurred since the last report, and an estimate of the water use efficiency improvements estimated to occur five and 10 years in the future. If an agricultural water supplier determines that an efficient water management practice is not locally cost effective or technically feasible, the supplier shall submit information documenting that determination.*

- (e) The department shall require information about the implementation of efficient water management practices to be reported using a standardized form developed pursuant to Section 10608.52.*
- (f) An agricultural water supplier may meet the requirements of subdivisions (d) and (e) by submitting to the department a water conservation plan submitted to the United States Bureau of Reclamation that meets the requirements described in Section 10828.*
- (g) On or before December 31, 2013, December 31, 2016, and December 31, 2021, the department, in consultation with the board, shall submit to the Legislature a report on the agricultural efficient water management practices that have been implemented and are planned to be implemented and an assessment of the manner in which the implementation of those efficient water management practices has affected and will affect agricultural operations, including estimated water use efficiency improvements, if any.*
- (h) The department may update the efficient water management practices required pursuant to subdivision (c), in consultation with the Agricultural Water Management Council, the United States Bureau of Reclamation, and the board. All efficient water management practices for agricultural water use pursuant to this chapter shall be adopted or revised by the department only after the department conducts public hearings to allow participation of the diverse geographical areas and interests of the state.*
- (i) (1) The department shall adopt regulations that provide for a range of options that agricultural water suppliers may use or implement to comply with the measurement requirement in paragraph (1) of subdivision (b).*
 - (2) The initial adoption of a regulation authorized by this subdivision is deemed to address an emergency, for purposes of Sections 11346.1 and 11349.6 of the Government Code, and the department is hereby exempted for that purpose from the requirements of subdivision (b) of Section 11346.1 of the Government Code. After the initial adoption of an emergency regulation pursuant to this subdivision, the department shall not request approval from the Office of Administrative Law to readopt the regulation as an emergency regulation pursuant to Section 11346.1 of the Government Code.*

**PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
[10608 – 10609.42]**

CHAPTER 5. Sustainable Water Management [10608.50 – 10608.50.]

10608.50. (a) The department, in consultation with the board, shall promote implementation of regional water resources management practices through increased incentives and removal of barriers consistent with state and federal law. Potential changes may include, but are not limited to, all of the following:

- (1) Revisions to the requirements for urban and agricultural water management plans.
 - (2) Revisions to the requirements for integrated regional water management plans.
 - (3) Revisions to the eligibility for state water management grants and loans.
 - (4) Revisions to state or local permitting requirements that increase water supply opportunities, but do not weaken water quality protection under state and federal law.
 - (5) Increased funding for research, feasibility studies, and project construction.
 - (6) Expanding technical and educational support for local land use and water management agencies.
- (b) No later than January 1, 2011, and updated as part of the California Water Plan, the department, in consultation with the board, and with public input, shall propose new statewide targets, or review and update existing statewide targets, for regional water resources management practices, including, but not limited to, recycled water, brackish groundwater desalination, and infiltration and direct use of urban stormwater runoff.

**PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
[10608 – 10609.42]**

CHAPTER 6. Standardized Data Collection [10608.52 – 10608.52.]

10608.52. (a) The department, in consultation with the board, the California Bay-Delta Authority or its successor agency, the State Department of Public Health, and the Public Utilities Commission, shall develop a single standardized water use reporting form to meet the water use information needs of each agency, including the needs of urban water suppliers that elect to determine and report progress toward achieving targets on a regional basis as provided in subdivision (a) of Section 10608.28.

- (b) At a minimum, the form shall be developed to accommodate information sufficient to assess an urban water supplier's compliance with conservation targets pursuant to Section 10608.24 and an agricultural water supplier's compliance with implementation of efficient water management practices pursuant to subdivision (a) of Section 10608.48. The form shall accommodate reporting by urban water suppliers on an individual or regional basis as provided in subdivision (a) of Section 10608.28.

**PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
[10608 – 10609.42]**

CHAPTER 7. Funding Provisions [10608.56 – 10608.60]

10608.56. (a) On and after July 1, 2016, an urban retail water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.

- (b) On and after July 1, 2013, an agricultural water supplier is not eligible for a water grant or loan awarded or administered by the state unless the supplier complies with this part.
- (c) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for achieving the per capita reductions. The

supplier may request grant or loan funds to achieve the per capita reductions to the extent the request is consistent with the eligibility requirements applicable to the water funds.

- (d) Notwithstanding subdivision (b), the department shall determine that an agricultural water supplier is eligible for a water grant or loan even though the supplier is not implementing all of the efficient water management practices described in Section 10608.48, if the agricultural water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the efficient water management practices. The supplier may request grant or loan funds to implement the efficient water management practices to the extent the request is consistent with the eligibility requirements applicable to the water funds.
- (e) Notwithstanding subdivision (a), the department shall determine that an urban retail water supplier is eligible for a water grant or loan even though the supplier has not met the per capita reductions required pursuant to Section 10608.24, if the urban retail water supplier has submitted to the department for approval documentation demonstrating that its entire service area qualifies as a disadvantaged community.
- (f) The department shall not deny eligibility to an urban retail water supplier or agricultural water supplier in compliance with the requirements of this part and Part 2.8 (commencing with Section 10800), that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the requirements of this part or Part 2.8 (commencing with Section 10800).

10608.60. (a) It is the intent of the Legislature that funds made available by Section 75026 of the Public Resources Code should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for grants to implement this part. In the allocation of funding, it is the intent of the Legislature that the department give consideration to disadvantaged communities to assist in implementing the requirements of this part.

- (b) It is the intent of the Legislature that funds made available by Section 75041 of the Public Resources Code, should be expended, consistent with Division 43 (commencing with Section 75001) of the Public Resources Code and upon appropriation by the Legislature, for direct expenditures to implement this part.

**PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
[10608 – 10609.42]**

**CHAPTER 8. Quantifying Agricultural Water Use Efficiency
[10608.64 – 10608.64.]**

10608.64. The department, in consultation with the Agricultural Water Management Council, academic experts, and other stakeholders, shall develop a methodology for quantifying the efficiency of agricultural water use. Alternatives to be assessed shall include, but not be limited to, determination of efficiency levels based on crop type or irrigation system distribution uniformity. On or before December 31, 2011, the department shall report to the Legislature on a proposed methodology and a plan for implementation. The plan shall include the estimated implementation costs and the types of data needed to support the methodology. Nothing in this section authorizes the department to implement a methodology established pursuant to this section.

**PART 2.55. SUSTAINABLE WATER USE AND DEMAND REDUCTION
[10608 – 10609.42]**

**CHAPTER 9. Urban Water Use Objectives and Water Use Reporting
[10609 – 10609.38]**

10609. (a) *The Legislature finds and declares that this chapter establishes a method to estimate the aggregate amount of water that would have been delivered the previous year by an urban retail water supplier if all that water had been used efficiently. This estimated aggregate water use is the urban retail water supplier's urban water use objective. The method is based on water use efficiency standards and local service area characteristics for that year. By comparing the amount of water actually used in the previous year with the urban water use objective, local urban water suppliers will be in a better position to help eliminate unnecessary use of water; that is, water used in excess of that needed to accomplish the intended beneficial use.*

(b) The Legislature further finds and declares all of the following:

(1) This chapter establishes standards and practices for the following water uses:

- (A) Indoor residential use.*
- (B) Outdoor residential use.*
- (C) CII water use.*
- (D) Water losses.*
- (E) Other unique local uses and situations that can have a material effect on an urban water supplier's total water use.*

(2) This chapter further does all of the following:

- (A) Establishes a method to calculate each urban water use objective.*
- (B) Considers recycled water quality in establishing efficient irrigation standards.*
- (C) Requires the department to provide or otherwise identify data regarding the unique local conditions to support the calculation of an urban water use objective.*
- (D) Provides for the use of alternative sources of data if alternative sources are shown to be as accurate as, or more accurate than, the data provided by the department.*
- (E) Requires annual reporting of the previous year's water use with the urban water use objective.*
- (F) Provides a bonus incentive for the amount of potable recycled water used the previous year when comparing the previous year's water use with the urban water use objective, of up to 10 percent of the urban water use objective.*

(3) This chapter requires the department and the board to solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter.

- (4) *This chapter preserves the Legislature's authority over long-term water use efficiency target setting and ensures appropriate legislative oversight of the implementation of this chapter by doing all of the following:*
 - (A) *Requiring the Legislative Analyst to conduct a review of the implementation of this chapter, including compliance with the adopted standards and regulations, accuracy of the data, use of alternate data, and other issues the Legislative Analyst deems appropriate.*
 - (B) *Stating legislative intent that the director of the department and the chairperson of the board appear before the appropriate Senate and Assembly policy committees to report on progress in implementing this chapter.*
 - (C) *Providing one-time-only authority to the department and board to adopt water use efficiency standards, except as explicitly provided in this chapter. Authorization to update the standards shall require separate legislation.*
- (c) *It is the intent of the Legislature that the following principles apply to the development and implementation of long-term standards and urban water use objectives:*
 - (1) *Local urban retail water suppliers should have primary responsibility for meeting standards-based water use targets, and they shall retain the flexibility to develop their water supply portfolios, design and implement water conservation strategies, educate their customers, and enforce their rules.*
 - (2) *Long-term standards and urban water use objectives should advance the state's goals to mitigate and adapt to climate change.*
 - (3) *Long-term standards and urban water use objectives should acknowledge the shade, air quality, and heat-island reduction benefits provided to communities by trees through the support of water-efficient irrigation practices that keep trees healthy.*
 - (4) *The state should identify opportunities for streamlined*

reporting, eliminate redundant data submissions, and incentivize open access to data collected by urban and agricultural water suppliers.

10609.2. (a) *The board, in coordination with the department, shall adopt long-term standards for the efficient use of water pursuant to this chapter on or before June 30, 2022.*

(b) *Standards shall be adopted for all of the following:*

(1) *Outdoor residential water use.*

(2) *Outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.*

(3) *A volume for water loss.*

(c) *When adopting the standards under this section, the board shall consider the policies of this chapter and the proposed efficiency standards' effects on local wastewater management, developed and natural parklands, and urban tree health. The standards and potential effects shall be identified by May 30, 2022. The board shall allow for public comment on potential effects identified by the board under this subdivision.*

(d) *The long-term standards shall be set at a level designed so that the water use objectives, together with other demands excluded from the long-term standards such as CII indoor water use and CII outdoor water use not connected to a dedicated landscape meter, would exceed the statewide conservation targets required pursuant to Chapter 3 (commencing with Section 10608.16).*

(e) *The board, in coordination with the department, shall adopt by regulation variances recommended by the department pursuant to Section 10609.14 and guidelines and methodologies pertaining to the calculation of an urban retail water supplier's urban water use objective recommended by the department pursuant to Section 10609.16.*

10609.4. (a) (1) *Until January 1, 2025, the standard for indoor residential water use shall be 55 gallons per capita daily.*

(2) *Beginning January 1, 2025, and until January 1, 2030, the standard for indoor residential water use shall be the greater of 52.5 gallons per capita daily or a standard recommended*

pursuant to subdivision (b).

(3) Beginning January 1, 2030, the standard for indoor residential water use shall be the greater of 50 gallons per capita daily or a standard recommended pursuant to subdivision (b).

(b) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and may jointly recommend to the Legislature a standard for indoor residential water use that more appropriately reflects best practices for indoor residential water use than the standard described in subdivision (a). A report on the results of the studies and investigations shall be made to the chairpersons of the relevant policy committees of each house of the Legislature by January 1, 2021, and shall include information necessary to support the recommended standard, if there is one. The studies and investigations shall also include an analysis of the benefits and impacts of how the changing standard for indoor residential water use will impact water and wastewater management, including potable water usage, wastewater, recycling and reuse systems, infrastructure, operations, and supplies.

(2) The studies, investigations, and report described in paragraph (1) shall include collaboration with, and input from, a broad group of stakeholders, including, but not limited to, environmental groups, experts in indoor plumbing, and water, wastewater, and recycled water agencies.

10609.6. *(a) (1) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor residential use for adoption by the board in accordance with this chapter.*

(2) (A) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).

(B) The standards shall apply to irrigable lands.

(C) The standards shall include provisions for swimming pools, spas, and other water features. Ornamental water features that are artificially supplied with water, including ponds,

lakes, waterfalls, and fountains, shall be analyzed separately from swimming pools and spas.

- (b) The department shall, by January 1, 2021, provide each urban retail water supplier with data regarding the area of residential irrigable lands in a manner that can reasonably be applied to the standards adopted pursuant to this section.*
- (c) The department shall not recommend standards pursuant to this section until it has conducted pilot projects or studies, or some combination of the two, to ensure that the data provided to local agencies are reasonably accurate for the data's intended uses, taking into consideration California's diverse landscapes and community characteristics.*

10609.8. *(a) The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, standards for outdoor irrigation of landscape areas with dedicated irrigation meters or other means of calculating outdoor irrigation use in connection with CII water use for adoption by the board in accordance with this chapter.*

- (b) The standards shall incorporate the principles of the model water efficient landscape ordinance adopted by the department pursuant to the Water Conservation in Landscaping Act (Article 10.8 (commencing with Section 65591) of Chapter 3 of Division 1 of Title 7 of the Government Code).*
- (c) The standards shall include an exclusion for water for commercial agricultural use meeting the definition of subdivision (b) of Section 51201 of the Government Code.*

10609.9. *For purposes of Sections 10609.6 and 10609.8, "principles of the model water efficient landscape ordinance" means those provisions of the model water efficient landscape ordinance applicable to the establishment or determination of the amount of water necessary to efficiently irrigate both new and existing landscapes. These provisions include, but are not limited to, all of the following:*

- (a) Evapotranspiration adjustment factors, as applicable.*
- (b) Landscape area.*
- (c) Maximum applied water allowance.*

- (d) *Reference evapotranspiration.*
- (e) *Special landscape areas, including provisions governing evapotranspiration adjustment factors for different types of water used for irrigating the landscape.*

10609.10. (a) *The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, performance measures for CII water use for adoption by the board in accordance with this chapter.*

- (b) *Prior to recommending performance measures for CII water use, the department shall solicit broad public participation from stakeholders and other interested persons relating to all of the following:*

- (1) *Recommendations for a CII water use classification system for California that address significant uses of water.*

- (2) *Recommendations for setting minimum size thresholds for converting mixed CII meters to dedicated irrigation meters, and evaluation of, and recommendations for, technologies that could be used in lieu of requiring dedicated irrigation meters.*

- (3) *Recommendations for CII water use best management practices, which may include, but are not limited to, water audits and water management plans for those CII customers that exceed a recommended size, volume of water use, or other threshold.*

- (c) *Recommendations of appropriate performance measures for CII water use shall be consistent with the October 21, 2013, report to the Legislature by the Commercial, Industrial, and Institutional Task Force entitled "Water Use Best Management Practices," including the technical and financial feasibility recommendations provided in that report, and shall support the economic productivity of California's commercial, industrial, and institutional sectors.*

- (d) (1) *The board, in coordination with the department, shall adopt performance measures for CII water use on or before June 30, 2022.*

- (2) *Each urban retail water supplier shall implement the performance measures adopted by the board pursuant to paragraph (1).*

10609.12. *The standards for water loss for urban retail water suppliers shall be the standards adopted by the board pursuant to subdivision (i) of Section 10608.34.*

10609.14. *(a) The department, in coordination with the board, shall conduct necessary studies and investigations and, no later than October 1, 2021, recommend for adoption by the board in accordance with this chapter appropriate variances for unique uses that can have a material effect on an urban retail water supplier's urban water use objective.*

(b) Appropriate variances may include, but are not limited to, allowances for the following:

- (1) Significant use of evaporative coolers.*
- (2) Significant populations of horses and other livestock.*
- (3) Significant fluctuations in seasonal populations.*
- (4) Significant landscaped areas irrigated with recycled water having high levels of total dissolved solids.*
- (5) Significant use of water for soil compaction and dust control.*
- (6) Significant use of water to supplement ponds and lakes to sustain wildlife.*
- (7) Significant use of water to irrigate vegetation for fire protection.*
- (8) Significant use of water for commercial or noncommercial agricultural use.*

(c) The department, in recommending variances for adoption by the board, shall also recommend a threshold of significance for each recommended variance.

(d) Before including any specific variance in calculating an urban retail water supplier's water use objective, the urban retail water supplier shall request and receive approval by the board for the inclusion of that variance.

(e) The board shall post on its Internet Web site all of the following:

- (1) A list of all urban retail water suppliers with approved variances.*
- (2) The specific variance or variances approved for each urban retail water supplier.*

(3) The data supporting approval of each variance.

10609.15. *To help streamline water data reporting, the department and the board shall do all of the following:*

- (a) Identify urban water reporting requirements shared by both agencies, and post on each agency's Internet Web site how the data is used for planning, regulatory, or other purposes.*
- (b) Analyze opportunities for more efficient publication of urban water reporting requirements within each agency, and analyze how each agency can integrate various data sets in a publicly accessible location, identify priority actions, and implement priority actions identified in the analysis.*
- (c) Make appropriate data pertaining to the urban water reporting requirements that are collected by either agency available to the public according to the principles and requirements of the Open and Transparent Water Data Act (Part 4.9 (commencing with Section 12400)).*

10609.16. *The department, in coordination with the board, shall conduct necessary studies and investigations and recommend, no later than October 1, 2021, guidelines and methodologies for the board to adopt that identify how an urban retail water supplier calculates its urban water use objective. The guidelines and methodologies shall address, as necessary, all of the following:*

- (a) Determining the irrigable lands within the urban retail water supplier's service area.*
- (b) Updating and revising methodologies described pursuant to subparagraph (A) of paragraph (1) of subdivision (h) of Section 10608.20, as appropriate, including methodologies for calculating the population in an urban retail water supplier's service area.*
- (c) Using landscape area data provided by the department or alternative data.*
- (d) Incorporating precipitation data and climate data into estimates of a urban retail water supplier's outdoor irrigation budget for its urban water use objective.*
- (e) Estimating changes in outdoor landscape area and population, and calculating the urban water use objective, for years when updated landscape imagery is not available from the department.*

- (f) *Determining acceptable levels of accuracy for the supporting data, the urban water use objective, and compliance with the urban water use objective.*

10609.18. *The department and the board shall solicit broad public participation from stakeholders and other interested persons in the development of the standards and the adoption of regulations pursuant to this chapter. The board shall hold at least one public meeting before taking any action on any standard or variance recommended by the department.*

10609.20. (a) *Each urban retail water supplier shall calculate its urban water use objective no later than January 1, 2024, and by January 1 every year thereafter.*

- (b) *The calculation shall be based on the urban retail water supplier's water use conditions for the previous calendar or fiscal year.*

- (c) *Each urban water supplier's urban water use objective shall be composed of the sum of the following:*

- (1) *Aggregate estimated efficient indoor residential water use.*
- (2) *Aggregate estimated efficient outdoor residential water use.*
- (3) *Aggregate estimated efficient outdoor irrigation of landscape areas with dedicated irrigation meters or equivalent technology in connection with CII water use.*
- (4) *Aggregate estimated efficient water losses.*
- (5) *Aggregate estimated water use in accordance with variances, as appropriate.*

- (d) (1) *An urban retail water supplier that delivers water from a groundwater basin, reservoir, or other source that is augmented by potable reuse water may adjust its urban water use objective by a bonus incentive calculated pursuant to this subdivision.*

- (2) *The water use objective bonus incentive shall be the volume of its potable reuse delivered to residential water users and to landscape areas with dedicated irrigation meters in connection with CII water use, on an acre-foot basis.*

- (3) *The bonus incentive pursuant to paragraph (1) shall be limited in accordance with one of the following:*

- (A) *The bonus incentive shall not exceed 15 percent of the urban water supplier's water use objective for any potable reuse water produced at an existing facility.*
 - (B) *The bonus incentive shall not exceed 10 percent of the urban water supplier's water use objective for any potable reuse water produced at any facility that is not an existing facility.*
- (4) *For purposes of this subdivision, "existing facility" means a facility that meets all of the following:*
 - (A) *The facility has a certified environmental impact report, mitigated negative declaration, or negative declaration on or before January 1, 2019.*
 - (B) *The facility begins producing and delivering potable reuse water on or before January 1, 2022.*
 - (C) *The facility uses microfiltration and reverse osmosis technologies to produce the potable reuse water.*
- (e) (1) *The calculation of the urban water use objective shall be made using landscape area and other data provided by the department and pursuant to the standards, guidelines, and methodologies adopted by the board. The department shall provide data to the urban water supplier at a level of detail sufficient to allow the urban water supplier to verify its accuracy at the parcel level.*
- (2) *Notwithstanding paragraph (1), an urban retail water supplier may use alternative data in calculating the urban water use objective if the supplier demonstrates to the department that the alternative data are equivalent, or superior, in quality and accuracy to the data provided by the department. The department may provide technical assistance to an urban retail water supplier in evaluating whether the alternative data are appropriate for use in calculating the supplier's urban water use objective.*

10609.21. (a) For purposes of Section 10609.20, and notwithstanding paragraph (4) of subdivision (d) of Section 10609.20, "existing facility" also includes the North City Project, phase one of the Pure Water San Diego Program, for which an environmental impact report was certified on April 10, 2018.

(b) This section shall become operative on January 1, 2019.

10609.22. *(a) An urban retail water supplier shall calculate its actual urban water use no later than January 1, 2024, and by January 1 every year thereafter.*

(b) The calculation shall be based on the urban retail water supplier's water use for the previous calendar or fiscal year.

(c) Each urban water supplier's urban water use shall be composed of the sum of the following:

- (1) Aggregate residential water use.*
- (2) Aggregate outdoor irrigation of landscape areas with dedicated irrigation meters in connection with CII water use.*
- (3) Aggregate water losses.*

10609.24. *(a) An urban retail water supplier shall submit a report to the department no later than January 1, 2024, and by January 1 every year thereafter. The report shall include all of the following:*

- (1) The urban water use objective calculated pursuant to Section 10609.20 along with relevant supporting data.*
- (2) The actual urban water use calculated pursuant to Section 10609.22 along with relevant supporting data.*
- (3) Documentation of the implementation of the performance measures for CII water use.*
- (4) A description of the progress made towards meeting the urban water use objective.*
- (5) The validated water loss audit report conducted pursuant to Section 10608.34.*

(b) The department shall post the reports and information on its internet website.

(c) The board may issue an information order or conservation order to, or impose civil liability on, an entity or individual for failure to submit a report required by this section.

10609.25. *As part of the first report submitted to the department by an urban retail water supplier no later than January 1, 2024, pursuant to*

subdivision (a) of Section 10609.24, each urban retail water supplier shall provide a narrative that describes the water demand management measures that the supplier plans to implement to achieve its urban water use objective by January 1, 2027.

10609.26. *(a) (1) On and after January 1, 2024, the board may issue informational orders pertaining to water production, water use, and water conservation to an urban retail water supplier that does not meet its urban water use objective required by this chapter. Informational orders are intended to obtain information on supplier activities, water production, and conservation efforts in order to identify technical assistance needs and assist urban water suppliers in meeting their urban water use objectives.*

(2) In determining whether to issue an informational order, the board shall consider the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24, and actions the urban retail water supplier has implemented or will implement in order to help meet the urban water use objective.

(3) The board shall share information received pursuant to this subdivision with the department.

(4) An urban water supplier may request technical assistance from the department. The technical assistance may, to the extent available, include guidance documents, tools, and data.

(b) On and after January 1, 2025, the board may issue a written notice to an urban retail water supplier that does not meet its urban water use objective required by this chapter. The written notice may warn the urban retail water supplier that it is not meeting its urban water use objective described in Section 10609.20 and is not making adequate progress in meeting the urban water use objective, and may request that the urban retail water supplier address areas of concern in its next annual report required by Section 10609.24. In deciding whether to issue a written notice, the board may consider whether the urban retail water supplier has received an informational order, the degree to which the urban retail water supplier is not meeting its urban water use objective, information provided in the report required by Section 10609.24,

and actions the urban retail water supplier has implemented or will implement in order to help meet its urban water use objective.

- (c) (1) On and after January 1, 2026, the board may issue a conservation order to an urban retail water supplier that does not meet its urban water use objective. A conservation order may consist of, but is not limited to, referral to the department for technical assistance, requirements for education and outreach, requirements for local enforcement, and other efforts to assist urban retail water suppliers in meeting their urban water use objective.*
- (2) In issuing a conservation order, the board shall identify specific deficiencies in an urban retail water supplier's progress towards meeting its urban water use objective, and identify specific actions to address the deficiencies.*
- (3) The board may request that the department provide an urban retail water supplier with technical assistance to support the urban retail water supplier's actions to remedy the deficiencies.*
- (d) A conservation order issued in accordance with this chapter may include requiring actions intended to increase water-use efficiency, but shall not curtail or otherwise limit the exercise of a water right, nor shall it require the imposition of civil liability pursuant to Section 377.*

10609.27. *Notwithstanding Section 10609.26, the board shall not issue an information order, written notice, or conservation order pursuant to Section 10609.26 if both of the following conditions are met:*

- (a) The board determines that the urban retail water supplier is not meeting its urban water use objective solely because the volume of water loss exceeds the urban retail water supplier's standard for water loss.*
- (b) Pursuant to Section 10608.34, the board is taking enforcement action against the urban retail water supplier for not meeting the performance standards for the volume of water losses.*

10609.28. *The board may issue a regulation or informational order requiring a wholesale water supplier, an urban retail water supplier, or a distributor of a public water supply, as that term is used in Section 350, to provide a monthly*

report relating to water production, water use, or water conservation.

10609.30. *On or before January 10, 2024, the Legislative Analyst shall provide to the appropriate policy committees of both houses of the Legislature and the public a report evaluating the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. The board and the department shall provide the Legislative Analyst with the available data to complete this report.*

(a) The report shall describe all of the following:

- (1) The rate at which urban retail water users are complying with the standards, and factors that might facilitate or impede their compliance.*
- (2) The accuracy of the data and estimates being used to calculate urban water use objectives.*
- (3) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.*
- (4) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.*
- (5) The early indications of how implementing this chapter might impact the efficiency of statewide urban water use.*
- (6) Recommendations, if any, for improving statewide urban water use efficiency and the standards and practices described in this chapter.*
- (7) Any other issues the Legislative Analyst deems appropriate.*

10609.32. *It is the intent of the Legislature that the chairperson of the board and the director of the department appear before the appropriate policy committees of both houses of the Legislature on or around January 1, 2026, and report on the implementation of the water use efficiency standards and water use reporting pursuant to this chapter. It is the intent of the Legislature that the topics to be covered include all of the following:*

- (a) The rate at which urban retail water suppliers are complying with the standards, and factors that might facilitate or impede their compliance.*

- (b) What enforcement actions have been taken, if any.*
- (c) The accuracy of the data and estimates being used to calculate urban water use objectives.*
- (d) Indications of the economic impacts, if any, of the implementation of this chapter on urban water suppliers and urban water users, including CII water users.*
- (e) The frequency of use of the bonus incentive, the volume of water associated with the bonus incentive, value to urban water suppliers of the bonus incentive, and any implications of the use of the bonus incentive on water use efficiency.*
- (f) An assessment of how implementing this chapter is affecting the efficiency of statewide urban water use.*

10609.34. *Notwithstanding Section 15300.2 of Title 14 of the California Code of Regulations, an action of the board taken under this chapter shall be deemed to be a Class 8 action, within the meaning of Section 15308 of Title 14 of the California Code of Regulations, provided that the action does not involve relaxation of existing water conservation or water use standards.*

10609.36. *(a) Nothing in this chapter shall be construed to determine or alter water rights. Sections 1010 and 1011 apply to water conserved through implementation of this chapter.*

- (b) Nothing in this chapter shall be construed to authorize the board to update or revise water use efficiency standards authorized by this chapter except as explicitly provided in this chapter. Authorization to update the standards beyond that explicitly provided in this chapter shall require separate legislation.*
- (c) Nothing in this chapter shall be construed to limit or otherwise affect the use of recycled water as seawater barriers for groundwater salinity management.*

10609.38. *The board may waive the requirements of this chapter for a period of up to five years for any urban retail water supplier whose water deliveries are significantly affected by changes in water use as a result of damage from a disaster such as an earthquake or fire. In establishing the period of a waiver, the board shall take into consideration the breadth of the damage and the time necessary for the damaged areas to recover from the disaster.*

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]
CHAPTER 1. General Declaration and Policy [10610 – 10610.4]

10610. This part shall be known and may be cited as the "Urban Water Management Planning Act."

10610.2. (a) The Legislature finds and declares all of the following:

- (1) The waters of the state are a limited and renewable resource subject to ever-increasing demands.
- (2) The conservation and efficient use of urban water supplies are of statewide concern; however, the planning for that use and the implementation of those plans can best be accomplished at the local level.
- (3) A long-term, reliable supply of water is essential to protect the productivity of California's businesses and economic climate, *and increasing long-term water conservation among Californians, improving water use efficiency within the state's communities and agricultural production, and strengthening local and regional drought planning are critical to California's resilience to drought and climate change.*
- (4) As part of its long-range planning activities, every urban water supplier should make every effort to ensure the appropriate level of reliability in its water service sufficient to meet the needs of its various categories of customers during normal, dry, and multiple dry water years *now and into the foreseeable future, and every urban water supplier should collaborate closely with local land-use authorities to ensure water demand forecasts are consistent with current land-use planning.*
- (5) Public health issues have been raised over a number of contaminants that have been identified in certain local and imported water supplies.
- (6) Implementing effective water management strategies, including groundwater storage projects and recycled water projects, may require specific water quality and salinity targets for meeting groundwater basins water quality objectives and promoting beneficial use of recycled water.

- (7) Water quality regulations are becoming an increasingly important factor in water agencies' selection of raw water sources, treatment alternatives, and modifications to existing treatment facilities.
 - (8) Changes in drinking water quality standards may also impact the usefulness of water supplies and may ultimately impact supply reliability.
 - (9) The quality of source supplies can have a significant impact on water management strategies and supply reliability.
- (b) This part is intended to provide assistance to water agencies in carrying out their long-term resource planning responsibilities to ensure adequate water supplies to meet existing and future demands for water.

10610.4. The Legislature finds and declares that it is the policy of the state as follows:

- (a) The management of urban water demands and efficient use of water shall be actively pursued to protect both the people of the state and their water resources.
- (b) The management of urban water demands and efficient use of urban water supplies shall be a guiding criterion in public decisions.
- (c) Urban water suppliers shall be required to develop water management plans to ~~actively pursue~~*achieve* the efficient use of available supplies *and strengthen local drought planning*.

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 2. Definitions [10611 – 10618]

10611. Unless the context otherwise requires, the definitions of this chapter govern the construction of this part.

10611.3. *"Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.*

10611.5. *"Demand management" means those water conservation measures, programs, and incentives that prevent the waste of water and promote the reasonable and efficient use and reuse of available supplies.*

10612. ~~"Customer" means a purchaser of water from a water supplier who uses the water for municipal purposes, including residential, commercial, governmental, and industrial uses.~~ *"Drought risk assessment" means a method that examines water shortage risks based on the driest five-year historic sequence for the agency's water supply, as described in subdivision (b) of Section 10635.*

10613. "Efficient use" means those management measures that result in the most effective use of water so as to prevent its waste or unreasonable use or unreasonable method of use.

10614. "Person" means any individual, firm, association, organization, partnership, business, trust, corporation, company, public agency, or any agency of such an entity.

10615. "Plan" means an urban water management plan prepared pursuant to this part. A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities. The components of the plan may vary according to an individual community or area's characteristics and its capabilities to efficiently use and conserve water. The plan shall address measures for residential, commercial, governmental, and industrial water demand management as set forth in Article 2 (commencing with Section 10630) of Chapter 3. In addition, a strategy and time schedule for implementation shall be included in the plan.

10616. "Public agency" means any board, commission, county, city and county, city, regional agency, district, or other public entity.

10616.5. "Recycled water" means the reclamation and reuse of wastewater for beneficial use.

10617. "Urban water supplier" means a supplier, either publicly or privately owned, providing water for municipal purposes either directly or indirectly to more than 3,000 customers or supplying more than 3,000 acre-feet of water annually. An urban water supplier includes a supplier or contractor for water, regardless of the basis of right, which distributes or sells for ultimate resale to customers. This part applies only to water supplied from public water systems subject to Chapter 4 (commencing with Section 116275) of Part 12 of Division 104 of the Health and Safety Code.

10617.5. *“Water shortage contingency plan” means a document that incorporates the provisions detailed in subdivision (a) of Section 10632 and is subsequently adopted by an urban water supplier pursuant to this article.*

10618. *“Water supply and demand assessment” means a method that looks at current year and one or more dry year supplies and demands for determining water shortage risks, as described in Section 10632.1.*

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 3. Urban Water Management Plans [10620 – 10645]

ARTICLE 1. General Provisions [10620 – 10621]

10620. (a) Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640).

- (b) Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.
- (c) An urban water supplier indirectly providing water shall not include planning elements in its water management plan as provided in Article 2 (commencing with Section 10630) that would be applicable to urban water suppliers or public agencies directly providing water, or to their customers, without the consent of those suppliers or public agencies.
- (d) (1) An urban water supplier may satisfy the requirements of this part by participation in areawide, regional, watershed, or basinwide urban water management planning where those plans will reduce preparation costs and contribute to the achievement of conservation~~and~~, efficient water use, *and improved local drought resilience.*
 - (2) *Notwithstanding paragraph (1), each urban water supplier shall develop its own water shortage contingency plan, but an urban water supplier may incorporate, collaborate, and otherwise share information with other urban water suppliers or other governing entities participating in an areawide, regional, watershed, or basinwide urban water management plan, an agricultural management plan, or groundwater sustainability plan development.*

- (3) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.
- (e) The urban water supplier may prepare the plan with its own staff, by contract, or in cooperation with other governmental agencies.
- (f) An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

10621. (a) Each urban water supplier shall update its plan at least once every five years on or before ~~December 31~~ *July 1*, in years ending in *six and one, incorporating updated and new information from the five and zero,* ~~except as provided in subdivision (d).~~ *years preceding each update.*

- (b) Every urban water supplier required to prepare a plan pursuant to this part shall, at least 60 days before the public hearing on the plan required by Section 10642, notify any city or county within which the supplier provides water supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. The urban water supplier may consult with, and obtain comments from, any city or county that receives notice pursuant to this subdivision.
- (c) *An urban water supplier regulated by the Public Utilities Commission shall include its most recent plan and water shortage contingency plan as part of the supplier's general rate case filings.*
- (d) The amendments to, or changes in, the plan shall be adopted and filed in the manner set forth in Article 3 (commencing with Section 10640).
- ~~(d)~~ (e) Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.
- (f) *Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.*

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 3. Urban Water Management Plans [10620 – 10645]

ARTICLE 2. Contents of Plans [10630 – 10634]

10630. It is the intention of the Legislature, in enacting this part, to permit levels of water management planning commensurate with the numbers of customers served and the volume of water supplied, *while accounting for impacts from climate change.*

10630.5. *Each plan shall include a simple lay description of how much water the agency has on a reliable basis, how much it needs for the foreseeable future, what the agency's strategy is for meeting its water needs, the challenges facing the agency, and any other information necessary to provide a general understanding of the agency's plan.*

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

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

- (1) *A detailed discussion of anticipated supply availability under a normal water year, single dry year, and droughts lasting at least five years, as well as more frequent and severe periods of drought, as described in the drought risk assessment. For each source of water supply, consider any information pertinent to the reliability analysis conducted pursuant to Section 10635, including changes in supply due to climate change.*
- (2) *When multiple sources of water supply are identified, a description of the management of each supply in correlation with the other identified supplies.*
- (3) *For any planned sources of water supply, a description of the measures that are being undertaken to acquire and develop those water supplies.*
- (4) If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information ~~shall be included in the plan:~~
 - ~~(1) A copy of~~ (A) *The current version of any groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720), any groundwater management plan adopted by the urban water supplier, including plans adopted pursuant to Part 2.75 (commencing with Section 10750), or any other specific authorization for groundwater management for basins underlying the urban water supplier's service area.*
 - (2) (B) *A description of any groundwater basin or basins from which the urban water supplier pumps groundwater. For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree. For ~~basins~~ a basin that ~~have~~ has not been adjudicated, information as to whether the department has identified the basin ~~or basins as overdrafted or has projected that the basin will~~*

~~become overdrafted if present management conditions continue, as a high- or medium-priority basin in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition. coordinate with groundwater sustainability agencies or groundwater management agencies listed in subdivision (c) of Section 10723 to maintain or achieve sustainable groundwater conditions in accordance with a groundwater sustainability plan or alternative adopted pursuant to Part 2.74 (commencing with Section 10720).~~

~~(3)~~ (C) A detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

~~(4)~~ (D) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

~~(c) (1) Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following:~~

~~(A) An average water year.~~

~~(B) A single dry water year.~~

~~(C) Multiple dry water years.~~

~~(2) 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.~~

- ~~(d)~~ Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.
- ~~(e) (1) Quantify~~ *(d) (1) For an urban retail water supplier, quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, based upon information developed pursuant to subdivision (a), identifying the uses among water use sectors, including, but not necessarily limited to, all of the following:*
 - (A) Single-family residential.
 - (B) Multifamily.
 - (C) Commercial.
 - (D) Industrial.
 - (E) Institutional and governmental.
 - (F) Landscape.
 - (G) Sales to other agencies.
 - (H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
 - (I) Agricultural.
 - (J) Distribution system water loss.
- (2) The water use projections shall be in the same five-year increments described in subdivision (a).
- (3) ~~(A) For the 2015 urban water management plan update, the distribution system water loss shall be quantified for the most recent 12-month period available. For all subsequent updates, the~~ *The distribution system water loss shall be quantified for each of the five years preceding the plan update, in accordance with rules adopted pursuant to Section 10608.34.*
 - (B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology

developed by the American Water Works Association.

~~(4) (A) If available~~ (C) *In the plan due July 1, 2021, and applicable in each update thereafter, data shall be included to show whether the urban retail water supplier, water met the distribution loss standards enacted by the board pursuant to Section 10608.34.*

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

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

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

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

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

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

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

- (i) Water waste prevention ordinances.
 - (ii) Metering.
 - (iii) Conservation pricing.
 - (iv) Public education and outreach.
 - (v) Programs to assess and manage distribution system real loss.
 - (vi) Water conservation program coordination and staffing support.
 - (vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.
- (2) For an urban wholesale water supplier, as defined in Section 10608.12, a narrative description of the items in clauses (ii), (iv), (vi), and (vii) of subparagraph (B) of paragraph (1), and a narrative description of its distribution system asset management and wholesale supplier assistance programs.
- ~~(g)~~ (f) Include a description of all water supply projects and water supply programs that may be undertaken by the urban water supplier to meet the total projected water use, as established pursuant to subdivision (a) of Section 10635. The urban water supplier shall include a detailed description of expected future projects and programs that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in ~~average~~, *normal and single-dry, and multiple-dry water years and for a period of drought lasting five consecutive water years*. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.
- ~~(h)~~ (g) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.
- ~~(i)~~ For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be

~~deemed in compliance with the requirements of subdivision (f) by complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.~~

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

10631.1. (a) The water use projections required by Section 10631 shall include projected water use for single-family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.

- (b) It is the intent of the Legislature that the identification of projected water use for single-family and multifamily residential housing for lower income households will assist a supplier in complying with the requirement under Section 65589.7 of the Government Code to grant a priority for the provision of service to housing units affordable to lower income households.

10631.2. (a) In addition to the requirements of Section 10631, an urban water management plan ~~may, but is not required to,~~ *shall* include any of the following information *that the urban water supplier can readily obtain*:

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

- (2) An estimate of the amount of energy used to convey water supplies to the water treatment plants or distribution systems.
 - (3) An estimate of the amount of energy used to treat water supplies.
 - (4) An estimate of the amount of energy used to distribute water supplies through its distribution systems.
 - (5) An estimate of the amount of energy used for treated water supplies in comparison to the amount used for nontreated water supplies.
 - (6) An estimate of the amount of energy used to place water into or withdraw from storage.
 - (7) Any other energy-related information the urban water supplier deems appropriate.
- (b) The department shall include in its guidance for the preparation of urban water management plans a methodology for the voluntary calculation or estimation of the energy intensity of urban water systems. The department may consider studies and calculations conducted by the Public Utilities Commission in developing the methodology.

~~**10631.5.** (a) (1) Beginning January 1, 2009, the terms of, and eligibility for, a water management grant or loan made to an urban water supplier and awarded or administered by the department, state board, or California Bay-Delta Authority or its successor agency shall be conditioned on the implementation of the water demand management measures described in Section 10631, as determined by the department pursuant to subdivision (b).~~

- ~~(2) For the purposes of this section, water management grants and loans include funding for programs and projects for surface water or groundwater storage, recycling, desalination, water conservation, water supply reliability, and water supply augmentation. This section does not apply to water management projects funded by the federal American Recovery and Reinvestment Act of 2009 (Public Law 111-5).~~
- ~~(3) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management~~

~~grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if the urban water supplier has submitted to the department for approval a schedule, financing plan, and budget, to be included in the grant or loan agreement, for implementation of the water demand management measures. The supplier may request grant or loan funds to implement the water demand management measures to the extent the request is consistent with the eligibility requirements applicable to the water management funds.~~

- ~~(4) (A) Notwithstanding paragraph (1), the department shall determine that an urban water supplier is eligible for a water management grant or loan even though the supplier is not implementing all of the water demand management measures described in Section 10631, if an urban water supplier submits to the department for approval documentation demonstrating that a water demand management measure is not locally cost effective. If the department determines that the documentation submitted by the urban water supplier fails to demonstrate that a water demand management measure is not locally cost effective, the department shall notify the urban water supplier and the agency administering the grant or loan program within 120 days that the documentation does not satisfy the requirements for an exemption, and include in that notification a detailed statement to support the determination.~~

~~(B) For purposes of this paragraph, "not locally cost effective" means that the present value of the local benefits of implementing a water demand management measure is less than the present value of the local costs of implementing that measure.~~

- ~~(b) (1) The department, in consultation with the state board and the California Bay-Delta Authority or its successor agency, and after soliciting public comment regarding eligibility requirements, shall develop eligibility requirements to implement the requirement of paragraph (1) of subdivision (a). In establishing these eligibility requirements, the department shall do both of the following:~~

~~(A) Consider the conservation measures described in the~~

~~Memorandum of Understanding Regarding Urban Water Conservation in California, and alternative conservation approaches that provide equal or greater water savings.~~

~~(B) Recognize the different legal, technical, fiscal, and practical roles and responsibilities of wholesale water suppliers and retail water suppliers.~~

~~(2) (A) For the purposes of this section, the department shall determine whether an urban water supplier is implementing all of the water demand management measures described in Section 10631 based on either, or a combination, of the following:~~

~~(i) Compliance on an individual basis.~~

~~(ii) Compliance on a regional basis. Regional compliance shall require participation in a regional conservation program consisting of two or more urban water suppliers that achieves the level of conservation or water efficiency savings equivalent to the amount of conservation or savings achieved if each of the participating urban water suppliers implemented the water demand management measures. The urban water supplier administering the regional program shall provide participating urban water suppliers and the department with data to demonstrate that the regional program is consistent with this clause. The department shall review the data to determine whether the urban water suppliers in the regional program are meeting the eligibility requirements.~~

~~(B) The department may require additional information for any determination pursuant to this section.~~

~~(3) The department shall not deny eligibility to an urban water supplier in compliance with the requirements of this section that is participating in a multiagency water project, or an integrated regional water management plan, developed pursuant to Section 75026 of the Public Resources Code, solely on the basis that one or more of the agencies participating in the project or plan is not implementing all of the water demand management measures described in Section 10631.~~

- ~~(c) In establishing guidelines pursuant to the specific funding authorization for any water management grant or loan program subject to this section, the agency administering the grant or loan program shall include in the guidelines the eligibility requirements developed by the department pursuant to subdivision (b).~~
- ~~(d) Upon receipt of a water management grant or loan application by an agency administering a grant and loan program subject to this section, the agency shall request an eligibility determination from the department with respect to the requirements of this section. The department shall respond to the request within 60 days of the request.~~
- ~~(e) The urban water supplier may submit to the department copies of its annual reports and other relevant documents to assist the department in determining whether the urban water supplier is implementing or scheduling the implementation of water demand management activities. In addition, for urban water suppliers that are signatories to the Memorandum of Understanding Regarding Urban Water Conservation in California and submit biennial reports to the California Urban Water Conservation Council in accordance with the memorandum, the department may use these reports to assist in tracking the implementation of water demand management measures.~~
- ~~(f) This section shall remain in effect only until July 1, 2016, and as of that date is repealed, unless a later enacted statute, that is enacted before July 1, 2016, deletes or extends that date.~~

~~**10631.7.** The department, in consultation with the California Urban Water Conservation Council, shall convene an independent technical panel to provide information and recommendations to the department and the Legislature on new demand management measures, technologies, and approaches. The panel shall consist of no more than seven members, who shall be selected by the department to reflect a balanced representation of experts. The panel shall have at least one, but no more than two, representatives from each of the following: retail water suppliers, environmental organizations, the business community, wholesale water suppliers, and academia. The panel shall be convened by January 1, 2009, and shall report to the Legislature no later than January 1, 2010, and every five years thereafter. The department shall review the panel report and include in the final report to the Legislature the department's~~

~~recommendations and comments regarding the panel process and the panel's recommendations.~~

(c) The Legislature finds and declares that energy use is only one factor in water supply planning and shall not be considered independently of other factors.

10632. ~~(a) The plan shall provide an~~ *Every urban water supplier shall prepare and adopt a water shortage contingency analysis that includes plan as part of its urban water management plan that consists of each of the following elements that are within the authority of the urban water supplier:*

- ~~(1) Stages~~ *The analysis of action water supply reliability conducted pursuant to be undertaken by Section 10635.*
- (2) The procedures used in conducting an annual water supply and demand assessment that include, at a minimum, both of the following:*
 - (A) The written decision making process that an urban water supplier in response will use each year to determine its water supply shortages reliability.*
 - (B) The key data inputs and assessment methodology used to evaluate the urban water supplier's water supply reliability for the current year and one dry year, including all of the following:*
 - (i) Current year unconstrained demand, considering weather, growth, and other influencing factors, such as policies to manage current supplies to meet demand objectives in future years, as applicable.*
 - (ii) Current year available supply, considering hydrological and regulatory conditions in the current year and one dry year. The annual supply and demand assessment may consider more than one dry year solely at the discretion of the urban water supplier.*
 - (iii) Existing infrastructure capabilities and plausible constraints.*
 - (iv) A defined set of locally applicable evaluation criteria that are consistently relied upon for each annual water supply and demand assessment.*

- (v) *A description and quantification of each source of water supply.*
- (3) (A) *Six standard water shortage levels corresponding to progressive ranges of up to a 10, 20, 30, 40, and 50 percent reduction in water supply, and an outline of specific water supply conditions that are applicable to each stage.*
- ~~(2) An estimate of the minimum water supply available during each of the next three water years shortages and greater than 50 percent shortage. Urban water suppliers shall define these shortage levels based on the driest three-year historic sequence for the agency's water supply.~~
- ~~(3) Actions to be undertaken by the urban water supplier to prepare for, and implement during, a suppliers' water supply conditions, including percentage reductions in water supply, changes in groundwater levels, changes in surface elevation or level of subsidence, or other changes in hydrological or other local conditions indicative of the water supply available for use. Shortage levels shall also apply to catastrophic interruption of water supplies, including, but not limited to, a regional power outage, an earthquake, and other disaster potential emergency events.~~
- ~~(4) (B) An urban water supplier with an existing water shortage contingency plan that uses different water shortage levels may comply with the requirement in subparagraph (A) by developing and including a cross-reference relating its existing categories to the six standard water shortage levels.~~
- (4) *Shortage response actions that align with the defined shortage levels and include, at a minimum, all of the following:*
 - (A) *Locally appropriate supply augmentation actions.*
 - (B) *Locally appropriate demand reduction actions to adequately respond to shortages.*
 - (C) *Locally appropriate operational changes.*
 - (D) *Additional, mandatory prohibitions against specific water use practices during water shortages, including,*

~~but not limited to, prohibiting the use of potable water for street cleaning that are in addition to state-mandated prohibitions and appropriate to the local conditions.~~

- ~~(5) 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.~~
- ~~(6) Penalties or charges for excessive use, where applicable.~~
- ~~(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), 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.~~
- (E) For each action, an estimate of the extent to which the gap between supplies and demand will be reduced by implementation of the action.*
- (5) Communication protocols and procedures to inform customers, the public, interested parties, and local, regional, and state governments, regarding, at a minimum, all of the following:*
 - (A) Any current or predicted shortages as determined by the annual water supply and demand assessment described pursuant to Section 10632.1.*
 - (B) Any shortage response actions triggered or anticipated to be triggered by the annual water supply and demand assessment described pursuant to Section 10632.1.*
 - (C) Any other relevant communications.*
- (6) For an urban retail water supplier, customer compliance, enforcement, appeal, and exemption procedures for triggered shortage response actions as determined pursuant to Section 10632.2.*

- (7)
 - (A) *A description of the legal authorities that empower the urban water supplier to implement and enforce its shortage response actions specified in paragraph (4) that may include, but are not limited to, statutory authorities, ordinances, resolutions, and contract provisions.*
 - (B) *A statement that an urban water supplier shall declare a water shortage emergency in accordance with Chapter 3 (commencing with Section 350) of Division 1.*
 - (C) *A statement that an urban water supplier shall coordinate with any city or county within which it provides water supply services for the possible proclamation of a local emergency, as defined in Section 8558 of the Government Code.*
- (8) ~~A draft water~~ *A description of the financial consequences of, and responses for, drought conditions, including, but not limited to, all of the following:*
 - (A) *A description of potential revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).*
 - (B) *A description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions described in paragraph (4).*
 - (C) *A description of the cost of compliance with Chapter 3.3 (commencing with Section 365) of Division 1.*
- (9) *For an urban retail water supplier, monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance and to meet state reporting requirements.*
- (10) *Reevaluation and improvement procedures for systematically monitoring and evaluating the functionality of the water shortage contingency ~~resolution or ordinance~~ plan in order to ensure shortage risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented as needed.*

~~(9) A mechanism for determining actual reductions in water use pursuant to the urban~~ (b) *For purposes of developing the water shortage contingency analysis.* ~~(b) Commencing with the urban water management plan update due July 1, 2016, for purposes of developing the water shortage contingency analysis pursuant to subdivision (a), the~~ an urban water supplier shall analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code.

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

10632.1. *An urban water supplier shall conduct an annual water supply and demand assessment pursuant to subdivision (a) of Section 10632 and, on or before July 1 of each year, submit an annual water shortage assessment report to the department with information for anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions consistent with the supplier's water shortage contingency plan. An urban water supplier that relies on imported water from the State Water Project or the Bureau of Reclamation shall submit its annual water supply and demand assessment within 14 days of receiving its final allocations, or by July 1 of each year, whichever is later.*

10632.2. *An urban water supplier shall follow, where feasible and appropriate, the prescribed procedures and implement determined shortage response actions in its water shortage contingency plan, as identified in subdivision (a) of Section 10632, or reasonable alternative actions, provided that descriptions of the alternative actions are submitted with the annual water shortage assessment report pursuant to Section 10632.1. Nothing in this section prohibits an urban water supplier from taking actions not specified in its water shortage contingency plan, if needed, without having to formally amend its urban water management plan or water shortage contingency plan.*

10632.3. *It is the intent of the Legislature that, upon proclamation by the Governor of a state of emergency under the California Emergency Services Act (Chapter 7 (commencing with Section 8550) of Division 1 of Title 2 of the Government Code) based on drought conditions, the board defer to implementation of locally adopted water shortage contingency plans to the extent practicable.*

10632.5. *(a) In addition to the requirements of paragraph (3) of subdivision (a) of Section 10632, beginning January 1, 2020, the plan shall include a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities.*

(b) An urban water supplier shall update the seismic risk assessment and mitigation plan when updating its urban water management plan as required by Section 10621.

(c) An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

10633. The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area, and shall include all of the following:

- (a) A description of the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*
- (b) A description of the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.*
- (c) A description of the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.*

- (d) A description and quantification of the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses.
- (e) The projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.
- (f) A description of actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.
- (g) A plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.

10634. The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 3. Urban Water Management Plans [10620 – 10645]

ARTICLE 2.5. Water Service Reliability [10635 – 10635.]

10635. (a) Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the *long-term* total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and ~~multiple dry~~ *a drought lasting five*

consecutive water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional, or local agency population projections within the service area of the urban water supplier.

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

- (1) A description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive water years, starting from the year following when the assessment is conducted.*
- (2) A determination of the reliability of each source of supply under a variety of water shortage conditions. This may include a determination that a particular source of water supply is fully reliable under most, if not all, conditions.*
- (3) A comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.*
- (4) Considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.*

(c) The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

~~(e)~~ *(d) Nothing in this article is intended to create a right or entitlement to water service or any specific level of water service.*

- ~~(d)~~ (e) Nothing in this article is intended to change existing law concerning an urban water supplier's obligation to provide water service to its existing customers or to any potential future customers.

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 3. Urban Water Management Plans [10620 – 10645]

ARTICLE 3. Adoption and Implementation of Plans [10640 – 10645]

10640. (a) Every urban water supplier required to prepare a plan pursuant to this part shall prepare its plan pursuant to Article 2 (commencing with Section 10630). The supplier shall likewise periodically review the plan as required by Section 10621, and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

(b) Every urban water supplier required to prepare a water shortage contingency plan shall prepare a water shortage contingency plan pursuant to Section 10632. The supplier shall likewise periodically review the water shortage contingency plan as required by paragraph (10) of subdivision (a) of Section 10632 and any amendments or changes required as a result of that review shall be adopted pursuant to this article.

10641. An urban water supplier required to prepare a *plan or a water shortage contingency plan* may consult with, and obtain comments from, any public agency or state agency or any person who has special expertise with respect to water demand management methods and techniques.

10642. Each urban water supplier shall encourage the active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of *both the plan and the water shortage contingency plan*. Prior to adopting ~~a plan~~ *neither*, the urban water supplier shall make *both the plan and the water shortage contingency plan* available for public inspection and shall hold a public hearing *or hearings* thereon. Prior to ~~the hearing~~ *any of these hearings*, notice of the time and place of *the* hearing shall be published within the jurisdiction of the publicly owned water supplier pursuant to Section 6066 of the Government Code. The urban water supplier shall provide notice of the time and place of *a* hearing to any city or county within which the supplier provides water supplies. *Notices by a local public agency pursuant to this section shall be provided pursuant to Chapter 17.5 (commencing with Section 7290) of*

Division 7 of Title 1 of the Government Code. A privately owned water supplier shall provide an equivalent notice within its service area. After the hearing or hearings, the plan or water shortage contingency plan shall be adopted as prepared or as modified after the hearing or hearings.

~~After the hearing, the plan shall be adopted as prepared or as modified after the hearing.~~

10643. An urban water supplier shall implement its plan adopted pursuant to this chapter in accordance with the schedule set forth in its plan.

10644. (a) (1) An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption. Copies of amendments or changes to the plans shall be submitted to the department, the California State Library, and any city or county within which the supplier provides water supplies within 30 days after adoption.

(2) The plan, or amendments to the plan, submitted to the department pursuant to paragraph (1) shall be submitted electronically and shall include any standardized forms, tables, or displays specified by the department.

~~(b) (1)~~ (b) *If an urban water supplier revises its water shortage contingency plan, the supplier shall submit to the department a copy of its water shortage contingency plan prepared pursuant to subdivision (a) of Section 10632 no later than 30 days after adoption, in accordance with protocols for submission and using electronic reporting tools developed by the department.*

(c) (1) (A) Notwithstanding Section 10231.5 of the Government Code, the department shall prepare and submit to the Legislature, on or before ~~December 31~~ *July 1*, in the years ending in ~~sixseven~~ and ~~onetwo~~, a report summarizing the status of the plans *and water shortage contingency plans* adopted pursuant to this part. The report prepared by the department shall identify the exemplary elements of the individual plans *and water shortage contingency plans*. The department shall provide a copy of the report to each urban water supplier that has submitted its plan *and water shortage contingency plan* to the department. The department shall also prepare reports and provide data for

any legislative hearings designed to consider the effectiveness of plans *and water shortage contingency plans* submitted pursuant to this part.

(B) The department shall prepare and submit to the board, on or before September 30 of each year, a report summarizing the submitted water supply and demand assessment results along with appropriate reported water shortage conditions and the regional and statewide analysis of water supply conditions developed by the department. As part of the report, the department shall provide a summary and, as appropriate, urban water supplier specific information regarding various shortage response actions implemented as a result of annual supplier-specific water supply and demand assessments performed pursuant to Section 10632.1.

(C) The department shall submit the report to the Legislature for the 2015 plans by July 1, 2017, and the report to the Legislature for the 2020 plans and water shortage contingency plans by July 1, 2022.

(2) A report to be submitted pursuant to *subparagraph (A)* of paragraph (1) shall be submitted in compliance with Section 9795 of the Government Code.

~~(c) (1) For the purpose of identifying the exemplary elements of the individual plans, the department shall identify in the report water demand management measures adopted and implemented by specific urban water suppliers, and identified pursuant to Section 10631, that achieve water savings significantly above the levels established by the department to meet the requirements of Section 10631.5.~~

~~(2) The department shall distribute to the panel convened pursuant to Section 10631.7 the results achieved by the implementation of those water demand management measures described in paragraph (1).~~

~~(3)~~ (d) The department shall make available to the public the standard the department will use to identify exemplary water demand management measures.

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

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

PART 2.6. URBAN WATER MANAGEMENT PLANNING [10610 – 10657]

CHAPTER 4. Miscellaneous Provisions [10650 – 10657]

10650. Any actions or proceedings, *other than actions by the board*, to attack, review, set aside, void, or annul the acts or decisions of an urban water supplier on the grounds of noncompliance with this part shall be commenced as follows:

- (a) An action or proceeding alleging failure to adopt a plan *or a water shortage contingency plan* shall be commenced within 18 months after that adoption is required by this part.
- (b) Any action or proceeding alleging that a plan *or water shortage contingency plan*, or action taken pursuant to ~~the plan~~ *neither*, does not comply with this part shall be commenced within 90 days after filing of the plan *or water shortage contingency plan or an amendment thereto* ~~to either~~ pursuant to Section 10644 or the taking of that action.

10651. In any action or proceeding to attack, review, set aside, void, or annul a plan *or a water shortage contingency plan*, or an action taken pursuant to ~~the plan~~ *neither* by an urban water supplier on the grounds of noncompliance with this part, the inquiry shall extend only to whether there was a prejudicial abuse of discretion. Abuse of discretion is established if the supplier has not proceeded in a manner required by law or if the action by the water supplier is not supported by substantial evidence.

10652. The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant to Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish

and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

10653. The adoption of a plan shall satisfy any requirements of state law, regulation, or order, including those of the ~~State Water Resources Control Board~~*board* and the Public Utilities Commission, for the preparation of water management plans, *water shortage contingency plans*, or conservation plans; provided, that if the *board* or the Public Utilities Commission requires additional information concerning water conservation, *drought response measures, or financial conditions* to implement its existing authority, nothing in this part shall be deemed to limit the board or the commission in obtaining that information. The requirements of this part shall be satisfied by any urban water demand management plan *that complies with analogous* federal laws or regulations after the effective date of this part, and which substantially meets the requirements of this part, or by any existing urban water management plan which includes the contents of a plan required under this part.

10654. An urban water supplier may recover in its rates the costs incurred in preparing its *urban water management plan, its drought risk assessment, its water supply and demand assessment, and its water shortage contingency plan* and implementing the reasonable water conservation measures included in *either of the plan*. ~~Any best water management practice that is included in the plan that is identified in the "Memorandum of Understanding Regarding Urban Water Conservation in California" is deemed to be reasonable for the purposes of this section~~*plans*.

10655. If any provision of this part or the application thereof to any person or circumstances is held invalid, that invalidity shall not affect other provisions or applications of this part which can be given effect without the invalid provision or application thereof, and to this end the provisions of this part are severable.

10656. An urban water supplier ~~that does~~*is not* prepare, adopt, and submit its urban water management plan to the department in accordance with this part, ~~is ineligible to receive funding pursuant to Division 24 (commencing with Section 78500) grant or Division 26 (commencing with Section 79000), loan awarded or receive drought assistance from administered by the state until~~*unless the urban water management plan is submitted pursuant to* supplier complies with this part.

10657. *The department may adopt regulations regarding the definitions of water, water use, and reporting periods, and may adopt any other regulations deemed necessary or desirable to implement this ~~article~~ part. In developing regulations pursuant to this section, the department shall solicit broad public participation from stakeholders and other interested persons.*

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Appendix B: Water Authority 2020 UWMP Implementation Documents

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**Notice of San Diego County Water Authority's
2015 Urban Water Management Plan Amendment,
2020 Urban Water Management Plan Preparation, and
Water Shortage Contingency Plan Preparation**

MEMBER AGENCIES

Carlsbad
Municipal Water District

City of Del Mar

City of Escondido

City of National City

City of Oceanside

City of Poway

City of San Diego

Fallbrook
Public Utility District

Helix Water District

Lakeside Water District

Olivenhain
Municipal Water District

Otay Water District

Padre Dam
Municipal Water District

Camp Pendleton
Marine Corps Base

Rainbow
Municipal Water District

Ramona
Municipal Water District

Rincon del Diablo
Municipal Water District

San Dieguito Water District

Santa Fe Irrigation District

South Bay Irrigation District

Vallecitos Water District

Valley Center
Municipal Water District

Vista Irrigation District

Yuima
Municipal Water District

**OTHER
REPRESENTATIVE**

County of San Diego

January 21, 2021

This letter is to inform you that the San Diego County Water Authority (Water Authority) is holding a public hearing (described below) for the Board of Directors to hear public comments and to discuss a draft technical amendment to the 2015 Urban Water Management Plan (UWMP) and a draft 2020 UWMP and Water Shortage Contingency Plan (WSCP).

California State law requires urban water suppliers to update their UWMP and WSCP every five years and notify the cities and counties within their service area that the plans are being prepared. The Water Authority must adopt and submit its 2020 UWMP and WSCP, which is part of the 2020 UWMP, by July 1, 2021, to the California Department of Water Resources (DWR).

The 2020 UWMP is required to contain a detailed evaluation of the supplies necessary to reliably meet demands over at least a 20-year period in both normal and dry years. Per recent DWR guidance, the 2015 UWMP must be amended to include information to demonstrate the Water Authority's reduced reliance on the Delta and improved regional self-reliance. The WSCP is required to include a detailed proposal for how a water supplier intends to act in the case of an actual water supply shortage.

In accordance with State law, the Water Authority will distribute a copy of its draft 2020 UWMP and draft amendment to its 2015 UWMP to the cities and county for public review at least two weeks prior to holding a tentatively scheduled public hearing on **March 25, 2021**.

Please feel free to contact Ms. Alexi Schnell in the Water Resources department at (858) 522-6778, or aschnell@sdewa.org, if you have any questions or would like additional information.

Sincerely,

Jeff Stephenson
Water Resources Manager

Cc: Kelley Gage, Director of Water Resources
Alexi Schnell, Water Resources Specialist

**SAN DIEGO COUNTY WATER AUTHORITY 2020 UWMP
60-DAY NOTICE TO LAND USE AGENCIES WITHIN SERVICE AREA MAILING LIST**

Jurisdiction/Agency	Name	Address
City of Carlsbad	Don Neu City Planner David De Cordova Housing Services Manager	City of Carlsbad Planning Department 1635 Faraday Drive Carlsbad, CA 92008 City of Carlsbad Planning Department 1635 Faraday Drive Carlsbad, CA 92008
City of Chula Vista	Tiffany Allen Development Services Director Scott Donaghe Principal Planner, Advance Planning Division	City of Chula Vista Development Services 276 Fourth Avenue, Bldg B Chula Vista, CA 91910-2631 City of Chula Vista Development Services 276 Fourth Avenue Chula Vista, CA 91910-2631
City of Coronado	Richard Grunow Director of Community Development, Redevelopment Services and Housing	City of Coronado Department of Community Development 1825 Strand Way Coronado, CA 92118-3005
City of Del Mar	Joseph Smith Planning and Community Development Director	City of Del Mar Planning and Comm. Dev. 1050 Camino Del Mar Del Mar, CA 92014-2604
City of El Cajon	Anthony Shute Director of Community Development	City of El Cajon Community Development Department 200 Civic Center Way, 3rd Floor El Cajon, CA 92020-3912
City of Encinitas	Roy Sapa'u Assistant Director	City of Encinitas Planning Division 505 S. Vulcan Avenue Encinitas, CA 92024-3633
City of Escondido	Mike Strong Director of Community	City of Escondido Community Dev. 201 N. Broadway Escondido, CA 92025-2709
City of Imperial Beach	Tyler Foltz Community Development Director Meagan Openshaw Associate Planner	City of Imperial Beach Community Development Department 825 Imperial Beach Boulevard Imperial Beach, CA 91932-2702 City of Imperial Beach Community Development Department 825 Imperial Beach Boulevard Imperial Beach, CA 91932-2702
City of La Mesa	Kerry Kusiak Director of Community Development	City of La Mesa Community Development Department 8130 Allison Avenue La Mesa, CA 91942

**Appendix B - Water Authority 2020 UWMP Implementation Documents
(60-Day Notice)**

Jurisdiction/Agency	Name	Address
City of Lemon Grove	Noah Alvey Community Development Manager	City of Lemon Grove Development Services Department 3232 Main Street Lemon Grove, CA 91945-1705
City of National City	Martin Reeder Principal Planner	City of National City Planning Department 1243 National City Boulevard National City, CA 91950-4301
City of Oceanside	Jeff Hunt City Planner	City of Oceanside Planning Department 300 N. Coast Highway Oceanside, CA 92054
City of Poway	Robert (Bob) Manis Director of Development Services Department	City of Poway Department of Development Services 13325 Civic Center Drive Poway, CA 92064
City of San Diego	Mike Hansen Director of Planning	City of San Diego Planning Department 9485 Aero Dr., M.S. 413 San Diego, CA 92123
County of San Diego	Kathleen Flannery Acting Director, Department of Planning and Development Services	County Department of Planning and Development Services 5510 Overland Avenue San Diego, CA 92123
City of San Marcos	Dahvia Lynch Development Services Director Joseph Farace Planning Manager	City of San Marcos Planning Department 1 Civic Center Drive San Marcos, CA 92069-2949 City of San Marcos Planning Department 1 Civic Center Drive San Marcos, CA 92069-2949
City of Santee	Melanie Kush Director of Development Services	City of Santee Development Services 10601 Magnolia Avenue Santee, CA 92071-1222
City of Solana Beach	Joseph Lim Director of Community Development	Solana Beach Community Development Department 635 S. Highway 101 Solana Beach, CA 92075-2215

**Appendix B - Water Authority 2020 UWMP Implementation Documents
(60-Day Notice)**

Jurisdiction/Agency	Name	Address
City of Vista	John Conley Director of Community Development and Engineering	Vista Community Development Department 200 Civic Center Drive Vista, CA 92084
	Patsy Chow City Planner	Vista Community Development Department 200 Civic Center Drive Vista, CA 92084
San Diego County Water Authority	Jeff Stephenson Water Resources Manager	San Diego County Water Authority 4677 Overland Avenue San Diego, CA 92123
	Alexi Schnell Water Resources Specialist	
San Diego Association of Governments	Coleen Clementson Director of Regional Planning	SANDAG 401 B Street, Suite 800 San Diego, CA 92101 (or Mail Station 980)
San Diego LAFCO	Keene Simonds Executive Officer	9335 Hazard Way, Suite 200 San Diego, CA 92123



**Member Agency Workgroup Meeting
2020 Urban Water Management Plan (UWMP)**

**March 2, 2020
(10 a.m. to noon)
San Diego County Water Authority
Board Room**

PURPOSE: Provide an overview on preparation of the Water Authority's 2020 UWMP, an update on new requirements and reporting for 2020, and to facilitate coordination with member agencies on local supply projections for the 2045 Regional Water Demand Forecast.

AGENDA

1. Introductions
2. Purpose, background and presentation overview (Kelley Gage)
3. Overview of Water Authority's approach to preparation of the 2020 UWMP (Alexi Schnell)
4. Review of process and schedule for 2045 Regional Water Demand Forecast (Tim Bombardier)
5. Water use efficiency (Elizabeth Lovsted)
6. Local supply projections (Alexi Schnell)
7. New requirements for 2020 UWMPs (Jeff Stephenson)
8. Outreach (Denise Vedder)
9. Schedule and next steps (Kelley Gage)
10. Discussion

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Appendix C: DWR 2020 UWMP Checklist

**(To be Included in Future Version of 2020 UWMP once DWR
Releases Final 2020 UWMP Checklist)**

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Appendix D: Documentation of Water Authority Supplies

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Documentation of Water Authority Supplies

Written Contracts or Other Proof

Imperial Irrigation District (IID) - Written Contracts or other Proof

The supply and costs associated with the transfer are based primarily on the following documents:

Agreement for Transfer of Conserved Water by and between IID and the Water Authority (April 29, 1998). This Agreement provides for a market-based transaction in which the Water Authority would pay IID a unit price for agricultural water conserved by IID and transferred to the Water Authority.

Revised Fourth Amendment to Agreement between IID and the Water Authority for Transfer of Conserved Water (October 10, 2003). Consistent with the executed Quantification Settlement Agreement (QSA) and related agreements, the amendments restructure the agreement and modify it to minimize the environmental impacts of the transfer of conserved water to the Water Authority.

Amended and Restated Agreement between Metropolitan and Water Authority for the Exchange of Water (October 10, 2003). This agreement was executed pursuant to the QSA and provides for delivery of the transfer water to the Water Authority.

Environmental Cost Sharing, Funding, and Habitat Conservation Plan Development Agreement among IID, Coachella Valley Water District (CVWD), and Water Authority (October 10, 2003). This Agreement provides for the specified allocation of QSA-related environmental review, mitigation, and litigation costs for the term of the QSA, and for development of a Habitat Conservation Plan.

Quantification Settlement Agreement Joint Powers Authority Creation and Funding Agreement (October 10, 2003). The purpose of this agreement is to create and fund the QSA Joint Powers Authority and to establish the limits of the funding obligation of CVWD, IID, and the Water Authority for environmental mitigation and Salton Sea restoration pursuant to SB 654 (Machado).

First Amendment to the Environmental Cost Sharing, Funding, and Habitat Conservation Plan Development Agreement (August 5, 2005). This agreement amends the roles and responsibilities of CVWD, IID, and the Water Authority related to the Habitat Conservation Plan and related permits.

Fifth Amendment to Agreement Between Imperial Irrigation District and San Diego County Water Authority for Transfer of Conserved Water (December 21, 2009). This agreement implements a settlement between the Water Authority and IID regarding the base contract price of transferred water.

Federal, State, and Local Permits/Approvals

Federal Endangered Species Act Permit. The U.S. Fish and Wildlife Service (USFWS) issued a Biological Opinion on January 12, 2001, that provides incidental take authorization and certain measures required to offset species impacts on the Colorado River regarding such actions.

State Water Resources Control Board (SWRCB) Petition. SWRCB adopted Water Rights Order 2002-0016 concerning IID and Water Authority's amended joint petition for approval of a long-term transfer of conserved water from IID to the Water Authority and to change the point of diversion, place of use, and purpose of use under Permit 7643.

Environmental Impact Report (EIR) for Conservation and Transfer Agreement. As lead agency, IID certified the Final EIR for the Conservation and Transfer Agreement on June 28, 2002.

U. S. Fish and Wildlife Service Biological Draft Biological Opinion and Incidental Take Statement on the Bureau of Reclamation's Voluntary Fish and Wildlife Conservation Measures and Associated Conservation Agreements with the California Water Agencies (12/18/02). The USFWS issued the biological opinion/incidental take statement for water transfer activities involving the Bureau of Reclamation and associated with IID/other California water agencies' actions on listed species in the Imperial Valley and Salton Sea (per the June 28, 2002 EIR).

Addendum to EIR for Conservation and Transfer Agreement. IID as lead agency and Water Authority as responsible agency approved addendum to EIR in October 2003.

Environmental Impact Statement (EIS) for Conservation and Transfer Agreement. Bureau of Reclamation issued a Record of Decision on the EIS in October 2003.

CA Department of Fish and Game California Endangered Species Act Incidental Take Permit #2081-2003-024-006). The CDFG issued this permit (10/22/04) for potential take effects on state-listed/fully protected species associated with IID/other California water

agencies' actions on listed species in the Imperial Valley and Salton Sea (per the June 28, 2002 EIR).

California Endangered Species Act Permit. A CESA permit was issued by California Department of Fish and Game (CDFG) on April 4, 2005, providing incidental take authorization for potential species impacts on the Colorado River.

Final Supplement to the IID Water Conservation and Transfer Project Final EIR/EIS for the Managed Marsh Complex. IID as lead agency prepared the Supplement to provide the additional environmental assessment required to implement the managed marsh complex required by existing permits and approvals for the water transfer (June 2008).

All-American Canal (AAC) and Coachella Canal (CC) Lining - Written Contracts or other Proof

The expected supply and costs associated with the lining projects are based primarily on the following documents:

U.S. Public Law 100-675 (1988). Authorized the Department of the Interior to reduce seepage from the existing earthen AAC and CC. The law provides that conserved water will be made available to specified California contracting water agencies according to established priorities.

California Department of Water Resources - Metropolitan Funding Agreement (2001). Reimburse Metropolitan for project work necessary to construct the lining of the CC in an amount not to exceed \$74 million. Modified by First Amendment (2004) to replace Metropolitan with the Authority. Modified by Second Amendment (2004) to increase funding amount to \$83.65 million, with addition of funds from Proposition 50.

California Department of Water Resources - IID Funding Agreement (2001). Reimburse IID for project work necessary to construct a lined AAC in an amount not to exceed \$126 million.

Metropolitan - CVWD Assignment and Delegation of Design Obligations Agreement (2002). Assigns design of the CC lining project to CVWD.

Metropolitan - CVWD Financial Arrangements Agreement for Design Obligations (2002). Obligates Metropolitan to advance funds to CVWD to cover costs for CC lining project

design and CVWD to invoice Metropolitan to permit the Department of Water Resources to be billed for work completed.

Allocation Agreement among the United States of America, The Metropolitan Water District of Southern California, Coachella Valley Water District, Imperial Irrigation District, San Diego County Water Authority, the La Jolla, Pala, Pauma, Rincon, and San Pasqual Bands of Mission Indians, the San Luis Rey River Indian Water Authority, the City of Escondido, and Vista Irrigation District (October 10, 2003). This agreement includes assignment of Metropolitan's rights and interest in delivery of 77,700 AF of Colorado River water previously intended to be delivered to Metropolitan to the Water Authority. Allocates water from the AAC and CC lining projects for at least 110 years to the Water Authority, the San Luis Rey Indian Water Rights Settlement Parties, and IID, if it exercises its call rights.

Amended and Restated Agreement between Metropolitan and Water Authority for the Exchange of Water (October 10, 2003). This agreement was executed pursuant to the QSA and provides for delivery of the conserved canal lining water to the Water Authority.

Agreement between Metropolitan and Water Authority regarding Assignment of Agreements related to the AAC and CC Lining Projects. This agreement was executed in April 2004 and assigns Metropolitan's rights to the Water Authority for agreements that had been executed to facilitate funding and construction of the AAC and CC lining projects.

Assignment and Delegation of Construction Obligations for the Coachella Canal Lining Project under the Department of Water Resources Funding Agreement No. 4600001474 from the San Diego County Water Authority to the Coachella Valley Water District, dated September 8, 2004.

Agreement Regarding the Financial Arrangements between the San Diego County Water Authority and Coachella Valley Water District for the Construction Obligations for the Coachella Canal Lining Project, dated September 8, 2004.

Agreement No. 04-XX-30-W0429 Among the United States Bureau of Reclamation, the Coachella Valley Water District, and the San Diego County Water Authority for the Construction of the Coachella Canal Lining Project Pursuant to Title II of Public Law 100-675, dated October 19, 2004.

Agreement No. 06-XX-30-W0447 Among the United States Department of the Interior Bureau of Reclamation, the Imperial Irrigation District, and San Diego County Water Authority for the Construction the AAC Lining Project Pursuant to Title II- of Public Law 100-675, dated January 13, 2006.

California Water Code Section 12560 et seq. This Water Code Section provides for \$200 million to be appropriated to the Department of Water Resources to help fund the canal lining projects in furtherance of implementing California's Colorado River Water Use Plan.

California Water Code Section 79567. This Water Code Section identifies \$20 million as available for appropriation by the California Legislature from the Water Security, Clean Drinking Water, Coastal, and Beach Protection Fund of 2002 (Proposition 50) to DWR for grants for canal lining and related projects necessary to reduce Colorado River water use. According to the Allocation Agreement, it is the intention of the agencies that those funds will be available for use by the Water Authority, IID, or CVWD for the AAC and CC lining projects.

California Public Resources Code Section 75050(b)(1). This section identifies up to \$36 million as available for water conservation projects that implement the Allocation Agreement as defined in the Quantification Settlement Agreement.

Agreement regarding the Financial Arrangements between IID and SDCWA for the AAC lining project (January 12, 2006). This agreement set forth the terms and conditions under which the design and construction obligations to be performed by IID will be financed.

Federal, State, and Local Permits/Approvals

AAC Lining Project Final EIR/EIS (March 1994). A final EIR/EIS analyzing the potential impacts of lining the AAC was completed by the Bureau of Reclamation (Reclamation) in March 1994. A Record of Decision was signed by Reclamation in July 1994, implementing the preferred alternative for lining the AAC. A re-examination and analysis of these environmental compliance documents by Reclamation in November 1999 determined that these documents continued to meet the requirements of the NEPA and the CEQA and would be valid in the future.

CC Lining Project Final EIR/EIS (April 2001). The final EIR/EIS for the CC lining project was completed in 2001. Reclamation signed the Record of Decision in April 2002. An amended Record of Decision has also been signed to take into account revisions to the project description.

Mitigation, Monitoring, and Reporting Program for Coachella Canal Lining Project (May 2001). SCH #1990020408; prepared by Coachella Valley Water District.

Environmental Commitment Plan for the Coachella Canal Lining Project (March 2003). Approved by the US Bureau of Reclamation (Boulder City, NV).

Environmental Commitment Plan and Addendum to the All-American Canal Lining Project EIR/EIS (June 2004). California State Clearinghouse Number SCH 90010472; prepared by IID).

Addendum to Final EIR/EIS and Amendment to Environmental Commitment Plan for the All-American Canal Lining Project (June 2006). Prepared by IID.

Addendum to the EIR/EIS for the Coachella Canal Lining Project for Wister Pond Sport Fishery Mitigation Project (November 2011).

Carlsbad Desalination Project – Written Contracts or other Proof

The supply and costs associated with the Carlsbad Desalination Project are based primarily on the following documents:

Development Agreement between City of Carlsbad and Poseidon (October 2009). A Development Agreement between Carlsbad and Poseidon was executed on October 5, 2009

Agreement of Term Sheet between the Water Authority and Poseidon Resources (July 2010). The Water Authority approved the Term Sheet at its July 2010 Board Meeting. The Term Sheet outlines the terms and conditions of a future Water Purchase Agreement with Poseidon and allocates the resources to prepare the draft Water Purchase Agreement.

Water Purchase Agreement between the Water Authority and Poseidon Resources (November 2012). The Water Authority approved the Water Purchase Agreement (WPA) at its November 2012 Board Meeting. The WPA enters the Water Authority into a contract with Poseidon for the purchase of between 48,000 acre-feet and 56,000 acre-feet of desalinated seawater per year for 30 years.

Federal, State, and Local Permits/Approvals

Carlsbad Desalination Project Final EIR (June 2006). The City of Carlsbad certified the Final EIR and the final Notice of Determination for the project was signed on June 14, 2006.

NPDES Discharge Permit (August 2006/May 2019). The Regional Water Quality Control Board issues the NPDES Discharge Permit for the project on August 16, 2006. A new NPDES Discharge Permit was issued for the project by the Regional Water Quality Control Board on May 8, 2019 to address modifications to the Carlsbad Desalination Plant's intake and discharge facilities.

Drinking Water Permit (October 2006). The California Department of Health Services approved the Conditional Drinking Water Permit on October 19, 2006.

Coastal Development Permit (November 2007). The California Coastal Commission approved, with conditions, the Coastal Development Permit on November 15, 2007. The Coastal Development Permit allows construction and operation of the project in the Coastal Zone.

State Lands Commission Lease Application (August 2008). Amends lease of land by Cabrillo Power I LLC (Cabrillo) from the State Lands Commission for the lands where the project will be constructed. Cabrillo and Poseidon entered into agreement on July 1, 2003, authorizing Poseidon to use those lands to construct the project.

Addendum to Final EIR (September 2009). An Addendum to the Final EIR was certified by the City of Carlsbad and Notice of Determination for the Addendum was signed on September 15, 2009. The Addendum modified water conveyance pipeline alignments.

Second Addendum to the Final EIR (November 2012). An Addendum to the Final EIR was certified by the San Diego County Water Authority and Notice of Determination for the Addendum was signed on November 29, 2012. The Second Addendum documented minor changes to the footprint associated with the Twin Oaks Valley Water Treatment Plant modifications, Pipeline 3 relining, San Marcos aqueduct connection point modifications, Pipeline 4 modifications, and the Macario Canyon pipeline alignment modification and pumping well.

Third Addendum to the Final EIR (September 2013). An Addendum to the Final EIR was certified by the San Diego County Water Authority and Notice of Determination for the Addendum was signed on September 26, 2013. The Third Addendum covered minor changes to the Macario Canyon pipeline alignment.

Fourth Addendum to the Final EIR (July 2014). An Addendum to the Final EIR was certified by the San Diego County Water Authority and Notice of Determination for the Addendum was signed on July 9, 2014. The Forth Addendum covers the construction of two above ground buildings at the San Marcos connection point site to house the previously approved “split level” flow control vaults and the relocation of previously approved underground interconnect vaults for Water Authority Pipelines 3 and 4 (proposed modifications)

Fifth Addendum to the Final EIR (January 2018). An Addendum to the Final EIR was completed by the San Diego County Water Authority. The Fifth Addendum covers the facilities necessary for the Carlsbad Municipal Water District to convey desalinated water, secured though a Uniform Contract with the San Diego County Water Authority, from the Carlsbad Desalination Plant into its distribution system.

Sixth Addendum to the Final EIR (February 2019). An Addendum to the Final EIR was certified by the San Diego County Water Authority and Notice of Determination for the Addendum was signed on March 26, 2019. The Sixth Addendum covers modifications to the Carlsbad Desalination Plant Intake and Discharge Facilities that comply with the Amendment to the Water Quality Control Plan for Ocean Water of California Addressing Desalination Facility Intakes, Brine Discharges, and Other Non-Substantive Changes, which was adopted by the State Water Resources Control Board on May 6, 2015.

Domestic Water Supply Permit (November 2015). The State Water Resources Control Board, Division of Drinking Water issued a domestic water supply permit for the Poseidon Resources – Carlsbad Desalination Plant on November 6, 2015.

Carryover Storage and San Vicente Dam Raise Project – Written Contracts or other Proof

The expected dry-year supply and costs associated with 100,000 AF of carryover storage at San Vicente Dam and Reservoir are based primarily on the following documents:

Agreement Between the San Diego County Water Authority and the City of San Diego for the Emergency Storage Project (Expansion of San Vicente Reservoir) (May 1998).

Agreement allowing the Water Authority emergency storage and future carryover storage

rights in San Vicente Reservoir, where the City maintains ownership and operation of the expanded San Vicente Dam and Reservoir facilities.

City of San Diego Ordinance Number O-18521 (May 1998). Ordinance passed by the City of San Diego City Council authorizing execution of above 1998 Agreement between the City and Water Authority.

Principles of Understanding Between the City of San Diego and the San Diego County Water Authority for the Emergency Storage Project (Operation of the San Vicente Reservoir and Lake Hodges Facilities) (February 2003). POU amending the 1998 Agreement clarifying operation of the expanded San Vicente Reservoir for emergency storage, and maintaining allowance for future expansion for carryover storage capacity.

Principles of Understanding Between the San Diego County Water Authority and the City of San Diego for the Operation of the San Vicente Reservoir Implemented Under the Carryover Storage Project (August 2008). POU amending the 1998 Agreement and 2003 POU establishing protocols for cooperation between the Water Authority and the City during carryover storage project implementation; issues included a reservoir regulating plan, operating plan, water quality studies, operation of existing City facilities, and land acquisition.

Federal, State, and Local Permits/Approvals

Carryover Storage and San Vicente Dam Raise EIR/EIS (April 2008). As CEQA lead agency, the Water Authority's Board of Directors certified the Final EIR/EIS on April 24, 2008. As NEPA lead agency, the U.S. Army Corps of Engineers issued a Record of Decision on the Final EIS on January 8, 2009.

Addendum to the Final EIR (October 2010). An Addendum to the Final EIR was completed by the San Diego County Water Authority. The Addendum covers intersection modifications to the Vigilante Road/Moreno Avenue intersection which provides access to the San Vicente Dam and Reservoir. This was considered a minor modification to the Carryover Storage and San Vicente Dam Raise Project.

California Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification (October 2008). RWQCB issued a Section 401 Certification on October 27, 2008, Water Quality Certification Number 08C-047.

U.S. Fish & Wildlife Service Biological Opinion for the San Diego County Water Authority's Carryover Storage and San Vicente Dam Raise Project (October 2008). U.S.

Fish & Wildlife Service issued a Biological Opinion on October 28, 2008, B.O. Number 2008B0061-2008F0732.

Reinitiation of U.S. Fish & Wildlife Service Biological Opinion for the San Diego County Water Authority's Carryover Storage and San Vicente Dam Raise Project (May 2009). U.S. Fish & Wildlife Service issued a revised Biological Opinion on May 8, 2009, B.O. Number 2008B0061-2008F0732-R001.

California Department of Fish & Game Streambed Alteration Agreement (October 2008). California Dept. of Fish & Game issued Streambed Alteration Agreement #1600-2008-0216-R5 on October 24, 2008, per Section 1602 of the Fish & Game Code.

Amendment to California Department of Fish & Game Streambed Alteration Agreement (February 2012). California Dept. of Fish & Game issued an Amendment to Streambed Alteration Agreement #1600-2008-0216-R5 on February 15, 2012, per Section 1602 of the Fish & Game Code.

U.S. Army Corps of Engineers Section 404 Permit (February 2009). U.S. Army Corps of Engineers issued a Section 404 permit on February 12, 2009, Permit Number SPL-200-01015-RRS.

Semitropic Original Water Bank - Written Contracts or other Proof

The expected supply and costs associated with out-of-county storage and transfer water are based primarily on the following documents:

Amended and Restated Assignment Agreement (June 2008). Assignment and purchase of Vidler Water Company, Inc. rights, title, interest and obligations in the Semitropic Water Banking and Exchange Program

Consent to Assignment (July 2008). Fulfills the condition precedent described in Section 3 of the Amended Assignment Agreement, including the requirements of subsections 3.1 and 3.2. The Second Amended Agreement and Third Amendment and the Fourth Amendment are incorporated in its entirety.

Memorandum of Assignment of Vidler-Semitropic Water Banking and Exchange Program (July 2008). Assigned to the Water Authority 18.5 percent of the rights and obligations of the Semitropic Water Banking and Exchange Program from Vidler Water Company, Inc.

Agreement Among the Department of Water Resources, Metropolitan Water District and Sutter Extension Water District for Storage and Conveyance of 2008 Transfer Water (April 2008). Set forth provisions governing the storage and conveyance of 13,071 AF of Transfer Water (before conveyance and carriage losses) via State Water Project facilities.

Sutter Extension Water District and the Water Authority Memorandum of Understanding for Transfer of Water (February 2008 and March 2008, respectively). Memorialize the agreement for program development, environmental review, and other preliminary actions necessary for an agreement for transfer of water on the general terms provided in Memorandum.

Agreement Among the Department of Water Resources, Metropolitan Water District and Butte Water District for Storage and Conveyance of 2008 Transfer Water (April 2008). Set forth provisions governing the storage and conveyance of 10,006 AF of Transfer Water (before conveyance and carriage losses) via State Water Project facilities.

Butte Water District and the Water Authority Memorandum of Understanding for Transfer of Water (February 2008 and March 2008, respectively). Memorialize the agreement for program development, environmental review, and other preliminary actions necessary for an agreement for transfer of water on the general terms provided in Memorandum.

Agreement for Exchange and Conveyance of Water between MWD and the Water Authority (September 2008). Agreement between the Water Authority and MWD to exchange water utilizing its storage and recovery rights in Semitropic's Groundwater Storage Program.

Consent Agreement (September 2008). Semitropic consents to the assignment by MWD from MWD's Semitropic Storage Account to the Water Authority's Semitropic Storage Account of approximately 16,117 AF of water.

Semitropic Rosamond Water Bank Authority - Written Contracts or other Proof

Agreement Among Semitropic-Rosamond Water Bank Authority and San Diego County Water Authority (August 2008). Assignment of 10,000 shares in the Semitropic-Rosamond Water Bank Authority – 5,000 shares in the Semitropic Water Storage District's Stored Water Recovery Unit and 5,000 shares in the Antelope valley Water Bank.

San Luis Rey Water Transfer Supply - Written Contracts or other Proof

San Luis Rey Indian Water Rights Settlement Act (1988). Authorized up to 16,000 AF per calendar year of conserved water for the Settlement Parties to resolve water right disputes on the San Luis Rey River.

Agreement for the Conveyance of Water Among the San Diego County Water Authority, the San Luis Rey Settlement Parties and the United States (October 2003). Established terms and conditions for the Supplemental Water Transfer deliveries that included obligation conditions, transportation rate, and creation of a delivery protocol document.

San Luis Rey Indian Water Rights Implementing Agreement (December 2014). Entered into by the City of Escondido, Vista Irrigation District, the State of California, the San Luis Rey River Indian Water Authority, and the Bands for the purpose of resolving all claims, controversies and issues involved in all pending proceedings among the parties.

Appendix E: Water Shortage Contingency Plan

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2020 Water Shortage Contingency Plan

San Diego County Water Authority
March 2021

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Water Shortage Contingency Plan

San Diego County Water Authority

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LIST OF ACRONYMS AND ABBREVIATIONS

AAC	All-American Canal
AF	acre-feet
AF/YR	acre-feet per year
Board	Water Authority Board of Directors
CC	Coachella Canal
CII	Commercial, Industrial, and Institutional
CRA	Colorado River Aqueduct
CSP	Carryover Storage Project
CSPG	Carryover Storage Policy Guidelines
CVP	Central Valley Project
DMP	Drought Management Plan (2006)
DWR	Department of Water Resources
EO	Executive Order
EOC	Emergency Operations Center
ESP	Emergency Storage Project
EWDP	Emergency Water Delivery Plans
FY	Fiscal Year
GPCD	gallons per capita per day
IAWP	Interim Agricultural Water Program
ICP	Integrated Contingency Plan
IID	Imperial Irrigation District
Lewis Carlsbad Desalination Plant	Claude “Bud” Lewis Carlsbad Desalination Plant
MAAT	Member Agency Advisory Team
M&I	municipal and industrial
MCB Camp Pendleton	Marine Corps Base Camp Pendleton
MWD	Metropolitan Water District of Southern California
MGD	Million Gallons per Day
Model Drought Ordinance	Model Drought Response Conservation Program Ordinance
MHM Plan	Multi-Hazard Mitigation Plan for San Diego County, California
PSAWR	Permanent Special Agricultural Water Rate
QSA	Quantification Settlement Agreement
RSF	Rate Stabilization Fund
SANDAG	San Diego Association of Governments
SB	Senate Bill
SDCWA	San Diego County Water Authority
SWP	State Water Project
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
Transfer Agreement	Water Authority–IID Water Conservation and Transfer Agreement
UWMP	Urban Water Management Plan
Water Authority	San Diego County Water Authority
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDM	Water Surplus and Drought Management Plan
WSDRP	Water Shortage and Drought Response Plan
WTP	Water Treatment Plant

Section 1

Introduction

1.1 Introduction

The San Diego County Water Authority's (Water Authority) Board of Directors (Board) approved its Drought Management Plan (DMP) in 2006. The DMP outlined a series of orderly, progressive steps for the Water Authority and its member agencies to take during shortages to minimize impacts to the region's economy and quality of life. It also included an allocation methodology to equitably allocate water supplies to its member agencies. The DMP was activated just a year later, in 2007, in response to the Metropolitan Water District of Southern California (MWD) drawing water from storage to meet demands. It was deactivated in 2011, when supply conditions improved.

In 2008, the Board approved another drought management document, the Model Drought Response Conservation Program Ordinance (Model Drought Ordinance). The Model Drought Ordinance focuses on core water use restrictions and is intended to assist the member agencies when updating or drafting local drought response ordinances and to provide regional consistency in drought response levels and messaging to the public and media. Also in 2008, the Board adopted Resolution 2008-11 that established procedures to administer the supply allocation methodology contained in the DMP.

Using lessons from previous shortage periods, in 2012, the DMP's supply allocation methodology was updated and the DMP was renamed the Water Shortage and Drought Response Plan (WSDRP). In 2014, the WSDRP was activated due to critically dry weather in California and its impact on water supply conditions. The WSDRP was deactivated in 2016 when supply conditions improved. In each instance when the DMP and WSDRP were activated, a smooth transition into and out of water allocations for the member agencies was possible due to the advanced planning efforts of the Water Authority and its member agencies. Those planning efforts also resulted in a framework that allowed for regional consistency in public drought messaging.

To ensure that the Water Authority and its member agencies continued to proactively plan for future water supply shortages, the Water Authority revised its WSDRP and renamed it the Water Shortage Contingency Plan (WSCP) in August 2017. The plan was named the WSCP for consistency with the long-term framework contained in the April 2017 Final Report, *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*. The long-term framework built on Executive Order (EO) B-37-16 and provided recommendations on implementation of long-term improvements to water supply management to support water conservation, including recommendations related to strengthening local drought resilience.

In 2018, recommendations included in EO B-37-16 related to strengthening local drought resilience were added to the Water Code with the passage of Senate Bill (SB) 606. In anticipation of that legislation, the Water Authority proactively included drought planning

elements from EO B-37-16 in the WSCP that was adopted by the Water Authority Board in August 2017. Additional requirements added to the Water Code after the passage of SB 606 were incorporated into the WSCP as part of the process to prepare the Water Authority's 2020 UWMP.

It is important to note that because the allocation methodology was included in the WSCP adopted by the Water Authority Board in August 2017, no changes were made to the allocation methodology during the process to prepare the 2020 WSCP. In addition, in August 2017 there was uncertainty as to when the State Water Resources Control Board (SWRCB) would complete its rulemaking process regarding the addition of new permanent water waste prohibitions. Because of that uncertainty, the Model Drought Ordinance was not updated in August 2017. However, it was updated as part of the process to prepare the 2020 WSCP. See Section 6 and Appendix B for more information.

1.2 Reliability

The Water Authority's mission is to provide a safe and reliable supply of water to its member agencies serving the San Diego region. The Water Authority and its member agencies continue to make great strides to develop a more drought-resilient mix of water resources, thereby increasing the region's ability to manage and avoid shortage situations. In partnership with and support of its member agencies, the region continues to be a leader in water conservation and water use efficiency.

In 2012, the Water Authority entered into a Water Purchase Agreement to purchase supplies from the 50 million gallons per day (MGD) Claude "Bud" Lewis Carlsbad Desalination Plant (Lewis Carlsbad Desalination Plant). This project is the largest seawater desalination facility in North America and came on-line in December 2015. The Lewis Carlsbad Desalination Plant provides a long-term drought-resilient water supply for the San Diego region. The San Vicente Dam raise was completed in 2014, providing both additional emergency storage and carryover storage for the region. The carryover storage capacity is critical to having a drought-resilient resource mix. It allows the region to store water in years when supplies are available and utilize those supplies during times of shortage.

Deliveries of conserved agricultural transfer water from the Imperial Valley were 190,000 AF/YR in 2020, and will reach a maximum of 200,000 AF/YR in 2021. The Water Authority continues to take delivery of 77,700 AF/YR of conserved water from projects to line the All-American Canal (AAC) and Coachella Canal (CC). Locally, the Water Authority's member agencies continue to evaluate, plan and implement local supply development through recycled water, brackish groundwater recovery, and potable reuse. In the future, the additional increment of supply to reduce reliance on imported sources and ensure drought-resilient supplies is expected to come from these efforts.

Demand management, or water-use efficiency, is an important ongoing component of the Water Authority's long-term strategy to increase the reliability of the San Diego region's water supply through diversification of its water supply portfolio. Since 1991, in partnership

with and support of its member agencies, the Water Authority's programs and initiatives cumulatively have conserved more than 1 million AF of water. The savings were achieved through various measures, including incentives for water-efficient devices, legislation, code changes, outreach campaigns, and programs.

In September 2020, the Water Authority Board adopted Ordinance No. 2020-04, that established its Permanent Special Agricultural Water Rate (PSAWR) Program effective January 1, 2021. The PSAWR Program is a water management program that provides additional water to the municipal and industrial (M&I) sector during water supply shortages. Eligible agricultural customers receive a cost benefit on their water rates and in return take a greater cutback during a supply shortage. Additional information on the PSAWR Program is in Section 4.3

While the region has plans to provide a high level of water reliability, there will always be some level of uncertainty associated with maintaining and developing local and imported supplies. Therefore, as a prudent measure, the Water Authority and its member agencies developed the comprehensive WSCP in the event that the region faces a water supply shortage.

1.3 Defining Drought

The definition of drought can vary depending on perspective. For the WSCP, the definition of drought is consistent with the definition used by the California Department of Water Resources (DWR). The DWR drought brochure, *Drought in California*, includes the following definition:

“From a water use perspective, drought is best defined by its impacts to a particular class of water users in a particular location. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users in a different part of the state or with a different water supply.”¹

Based on this definition, water supply shortages in different regions of the state do not necessarily constitute a drought in the San Diego region.

1.4 Senate Bill 606

On May 9, 2016, Governor Brown issued EO B-37-16, which built on temporary statewide emergency water restrictions to establish longer-term water conservation measures, including permanent monthly water use reporting and new permanent water use standards that go beyond the 20% reduction in per capita urban water use required in SB X7-7. The executive order also permanently banned wasteful practices such as hosing off sidewalks, driveways and other hardscapes, and called for long-term improvements in local drought

¹ *Drought in California*, California Department of Water Resources, Natural Resources Agency, Fall 2015, p. 4.

preparation.

The directives in EO B-37-16 related to improvements in local drought preparation are Items 8 and 9. Item 8 required DWR to strengthen requirements for urban water shortage contingency plans to include adequate actions to respond to droughts that last at least five years, as well as more frequent and severe periods of drought. Item 9 required DWR to work with stakeholders to update the requirements for water shortage contingency plans. The executive order also directed the SWRCB to make adjustments to the emergency water conservation regulation in recognition of the differing water supply conditions across the state. This directive resulted in a change from the mandated conservation standard to a self-certification approach that recognized the unique supply conditions of each region/community.

In 2018, the California State Legislature enacted SB 606 and Assembly Bill 1668 in response to EO B-37-16. The provisions of these bills focused on improving drought planning and water conservation in the state. Of the two bills, SB 606 included provisions related to drought planning and strengthening local drought resilience. The WSCP meets the requirements of the Water Code.

1.5 Organization of the Water Shortage Contingency Plan

The WSCP is organized into the following 10 sections and appendices:

Section 1: Introduction, discusses the purpose of the WSCP and provides an overview of its content. SB 606, which requires urban water suppliers to adopt a stand-alone WSCP as part of their 2020 UWMP, is also discussed. An overview of the Water Authority's actions to increase the region's water supply reliability, as well as a discussion on defining drought, is included in the section.

Section 2: Plan Preparation and Re-Evaluation, provides information on preparation of the WSCP and background information on preparation of the 2006 DMP, which was updated in 2012 to become the WSDRP. The section outlines a procedure to evaluate implementation and make updates to the WSCP.

Section 3: Drought Response and Shortage Management Actions, includes a review of historic drought periods and the Water Authority's actions during those periods. The section also includes lessons learned from the events.

Section 4: Annual Water Supply and Demand Assessment, contains a discussion on the annual water supply and demand assessment, including the need to perform the assessment and the process. It provides details on the evaluation criteria to be used and basic supply and demand assumptions.

Section 5: Drought Response Actions and Levels, provides an overview of the six regional shortage response actions and levels, including the percent action required at each level and

the water supply conditions that trigger the response levels. The section also discusses the potential scenarios that would trigger a certain shortage response level.

Section 6: Extraordinary Demand Reduction Measures, identifies a list of potential consumer water use restrictions and extraordinary measures to reduce demands during shortage events. These measures, along with the response level information discussed in Section 5, form the basis for Model Drought Ordinance. Section 6 also discusses potential measures that the member agencies and municipalities can take to conserve water.

Section 7: Municipal and Industrial Supply Allocation Methodology, provides a detailed description of the supply allocation methodology. The methodology provides the Water Authority a means to allocate its supplies to its member agencies in a water supply shortage situation. An example of the calculation procedure is included for illustrative purposes.

Section 8: Catastrophic Water Shortage, describes how the Water Authority manages catastrophic water shortages caused by an event such as an earthquake. The section includes a discussion on the Integrated Contingency Plan, Emergency Water Delivery Plans, and Emergency Storage Program.

Section 9: Communication Plan, describes the elements of the communication plan, including coordination, key audiences, and communication objectives. It also discusses strategies and tactics for each water supply shortage level.

Section 10: Implementation, summarizes the role of the Board to activate the plan and consider potential shortage response actions. It also includes a discussion on the role of the Member Agency Advisory Team during a water supply shortage event and how the Water Authority will manage reduced revenues due to implementation of demand reduction measures.

Appendix A: Carryover Storage Policy Guidelines

Appendix B: Model Drought Ordinance

Appendix C: Examples of Potential Customer Water Use Prohibitions

Appendix D: Water Authority Board Resolution 2020-__

Appendix E: Multi-Jurisdictional Hazard Mitigation Plan

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Section 2

Plan Preparation and Re-Evaluation

Section 2 discusses the process to prepare the original 2006 DMP, the update process for the DMP's allocation methodology in 2012, preparation of the 2017 WSCP and its subsequent 2020 update as part of the Water Authority's 2020 UWMP, and the schedule to re-evaluate the WSCP in future years.

2.1 Drought Management Plan (2006)

In 2006, the DMP was prepared to identify the actions that the Water Authority and its member agencies would take if faced with drought conditions, and specifically, how supplies would be allocated. The process to draft the DMP was extensive and included multiple meetings with member agency staff and multiple presentations and reports to the Board. An overview of the process is detailed below.

2.1.1 Member Agency Technical Advisory Committee

Preparation and implementation of the DMP included input and support from the Water Authority's member agencies. Recognizing the importance of member agency involvement, the Water Authority formed a Technical Advisory Committee (TAC) to provide input on development of the DMP. The TAC met 10 times between March 2005 and February 2006, and included a representative from each of the member agencies. Key to the successful preparation of the plan was full involvement from all member agencies which ensured effective communication and understanding of member agencies' issues and concerns. To assist in the effort, a consultant team was hired to facilitate the TAC meetings and assist with technical details, such as the historic context of drought plans in Southern California and the development of the allocation model. The TAC members worked together successfully to develop the elements of the DMP.

2.1.2 Principles

Twenty-three principles were developed to provide guidance to the Water Authority and its member agencies to develop and implement the 2006 DMP. The principles were initially drafted based on results from a questionnaire that was completed by the TAC members. The principles were then revised and finalized based upon input received during a series of TAC meetings.

The principles used during development of the 2006 DMP are shown below and were grouped into the following five categories: 1) Overall Plan; 2) Communication Strategy; 3) Drought Supply Enhancement; 4) Drought Response Stages; and 5) Allocation Methodology.

Overall Plan

1. *The DMP will be developed in cooperation with the member agencies and include all aspects of drought planning – including steps to avoid rationing, drought response stages, allocation methodology, pricing, and communication strategy.*

Communication Strategy

2. *An on-going, coordinated and regional public outreach program shall be developed by the Water Authority that provides a clear and consistent message to the public regarding water supplies and specific conservation measures. The outreach program will also recognize and support member agency communication efforts that address specific retail level allocations.*
3. *A Drought Coordination Team, made up of one representative from each member agency, will be established to assist the Water Authority in implementation of the DMP. This includes items such as formulation and implementation of the public outreach program, timing of drought stages, selection of drought supply actions, and addressing potential issues surrounding implementation of the shortage allocation methodology.*
4. *The drought management plan should specify actions and timing of communications.*

Drought Supply Enhancement

5. *The Water Authority and its member agencies will work cooperatively to avoid and/or minimize rationing during droughts through supply enhancement and voluntary demand reduction measures.*
6. *Future Water Authority carryover storage supplies will be managed and utilized to assist in meeting M&I demands during drought periods. Member agencies will be encouraged to develop carryover storage.*
7. *The Water Authority will consider securing option and/or spot water transfers to meet the reliability goal set by the Board. The cost of this regional supply will be melded into the Water Authority's supply costs for all classes of service that benefit.*
8. *Subject to the Water Authority's wheeling policy, if a member agency purchases transfer water from a source other than the Water Authority, the full cost of the transfer, including, but not limited to, purchase costs, wheeling costs, and administrative costs, will be borne by said member agency.*
9. *Emergency Storage Project (ESP) supplies may be available when any member agency's non-interruptible firm demands drop below a 75% service level.*

10. *The quantities of supplies from the ESP to be removed from storage will be based on a minimum amount necessary to meet essential health, safety, and firefighting needs, and maximum amount based on the need to ensure adequate supplies remain for a catastrophic event (e.g. earthquake).*

Drought Response Stages

11. *Develop drought response stages, which at a minimum, accomplish the following:*
- *Can be easily communicated to the public;*
 - *Flexible to handle unexpected changes in demand and supply conditions;*
 - *Includes percent reduction (voluntary or mandatory) per stage; and*
 - *Includes both supply enhancement and emergency demand reduction methods.*
12. *Targets for achieving the emergency demand reduction measures should take into account the region's already aggressive long-term water conservation program.*
13. *The decision on when, and in which sequence drought enhancement supplies will be utilized during different stages will include consideration of the following factors:*
- *Location – Out-of-region supplies will be utilized in the earlier stages, prior to in-county storage, because these supplies are more vulnerable to implementation risks such as seismic events;*
 - *Cost – Priority will be given to maximizing supply reliability and at the same time using the most cost-effective supplies; and*
 - *Limitations – Potential restrictions on the use of drought enhancement supplies is a factor in determining supply availability (e.g. potential restrictions on ESP supplies).*

Allocation Methodology

14. *The allocation methodology will be equitable, easy to administer, contain financial penalties and pricing signals, and a communication strategy to ensure member agencies and the public are informed and understand the need to conserve.*
15. *In order to protect the economic health of the entire region, it is very important for the allocation methodology to avoid large, uneven retail impacts across the region. The methodology should include a minimum level of retail agency reliability to ensure equitable allocation among the member agencies.*
16. *With the exception of allocating water from the ESP, the Water Authority shall make no distinction among customers paying the same M&I rate (e.g. non-Interim Agricultural Water Program (IAWP) agriculture, residential, commercial, and industrial).*
17. *Additional IAWP cutbacks beyond the initial 30% faced by IAWP customers should be equally applied to both IAWP and M&I customers.*

- 18. A member agency that has developed local projects and instituted conservation measures should not be penalized in the computation of allocations.*
- 19. To help balance out the financial costs and risks associated with development of local resources, the shortage allocation methodology should provide an incentive to those member agencies that have developed local supplies.*
- 20. The base-year, upon which allocations will be derived, will be based on historic demands. Adjustments to the base-year will be made for demographic changes, growth, local supplies, demand hardening, and supplies allocated under interruptible service programs.*
- 21. A member agency's base-year will be adjusted to reflect the regional financial contribution from the Water Authority for development of local projects. The adjustment will take into account the risks associated with developing the local projects.*
- 22. A member agency will not be able to market its unused allocation to other agencies within the Water Authority's service area at a cost higher than the Water Authority's charges for those supplies.*
- 23. Penalty rates, along with other demand reduction measures, will be used by the Water Authority to encourage conservation during a drought.*

2.1.3 Report Approval

Water Authority staff, with consultant assistance, prepared an initial draft of the DMP based on results from the TAC member discussions on DMP elements. TAC members reviewed the draft report and their comments were incorporated. In February 2006, the TAC supported forwarding the report to the Board's Water Planning Committee for consideration. The DMP elements were presented to the Board through a series of meetings and workshops, with final approval of the DMP in May 2006.

2.2 Water Shortage and Drought Response Plan (2012)

The DMP was activated in 2007 and deactivated in 2011. During the activation period, MWD allocated supplies to its member agencies, including the Water Authority, from July 2009 to April 2011. In response to the allocation from MWD, the Water Authority activated the mandatory cutback stage of its DMP and allocated supplies to its member agencies.

An evaluation of the implementation of the Water Authority's allocation methodology revealed that there was consensus among Water Authority and member agency staff that the allocation methodology worked as envisioned and served as an effective, equitable means to allocate supplies. However, the evaluation also revealed that specific elements of the allocation methodology could be improved.

A series of member agency meetings were held to gain input and aid staff in the development of modifications to the allocation methodology. The first meeting was in May 2011. Additional meetings were postponed until MWD finalized adjustments to its Water Supply Allocation Plan (WSAP) in September 2011. Water Authority staff resumed meetings with member agency staff between October 2011 and March 2012. At the completion of the meetings a technical report was prepared by Water Authority staff to provide a detailed description of the modifications. The Board approved the updated allocation methodology in April 2012, and formally renamed the DMP as the WSDRP.

2.3 2017 Water Shortage Contingency Plan

The process to develop the 2017 WSCP began with a workshop-type meeting with the member agency managers in March 2017. It continued with monthly progress updates with the member agency managers and opportunities for the member agency managers to provide comments on the draft WSCP. In April 2017, a special meeting of the Board's Water Planning Committee was held to present proposed revisions to the WSDRP (which was later renamed the WSCP). The 2017 WSCP was approved by the Board in August 2017 as a stand-alone document.

The 2017 WSCP was a comprehensive shortage planning document that incorporated elements not previously included in the WSDRP. Those elements included information on catastrophic water shortage planning (Section 8), Board-approved guidelines to manage carryover storage, and an annual M&I reliability analysis (Section 4). The communication plan (Section 9) in the WSDRP was updated in the 2017 WSCP based on lessons learned from previous shortage periods. In addition, the 2017 WSCP incorporated elements from the state's long-term framework document, *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*, which was released in April 2017. Because some elements of the state's long-term framework had yet to be fully implemented through a rulemaking process, including the drafting of the permanent water waste prohibitions, the Water Authority's Model Drought Ordinance was not be updated in the 2017 WSCP. The allocation methodology was updated in 2012, and therefore, it was not updated in the 2017 WSCP.

2.4 2020 Water Shortage Contingency Plan

In 2018, with the passage of SB 606, the Water Code was amended to include new requirements related to water shortage contingency planning (§10632). The 2017 WSCP was prepared in anticipation of these new requirements and as a result, only minimal, non-substantive updates were required during preparation of the 2020 WSCP. One of those new requirements is that water suppliers must prepare and adopt a WSCP as part of their UWMP, but that the WSCP must also be a stand-alone document so that a water supplier can update it without having to update its UWMP. The 2020 WSCP functions as a stand-alone document.

2.5 Plan Re-Evaluation

The WSCP will be re-evaluated at least every five years in coordination with the urban water

management plan update, but the frequency of the re-evaluations could increase based on the needs of the Water Authority and its member agencies. Re-evaluations will be based on lessons learned, new statutory requirements, continued local supply development, or other factors.

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Section 3

Historic Drought Response and Shortage Management Actions

The Water Authority has activated its drought planning document twice since 2006. The first time was during the period of 2007 to 2011. During that period, the WSDRP was known as the DMP and was activated in response to MWD withdrawing water from storage to meet demands. By 2012, the DMP had been renamed the WSDRP, and was activated in 2014 in response to the Governor's declaration of a state of emergency due to severe drought conditions, as well as in response to drought response actions being considered at MWD. In each instance, the advanced planning efforts of the Water Authority and its member agencies allowed for a smooth transition into and out of water allocations. Additional information on the drought management actions taken during the drought periods are discussed below.

3.1 Significant Drought and Shortage-Related Events (2007 to 2011)

2007

The 2007–2011 California drought marked the beginning of increased restrictions on State Water Project (SWP) pumping from the Bay-Delta due to environmental considerations. The Colorado River was in the midst of a prolonged multi-year drought that began in 2000. In April 2007, MWD notified its member agencies that it expected challenges in meeting demands due to insufficient imported water supplies from the SWP and the Colorado River. In order to meet demands, MWD announced that it would implement shortage-related actions consistent with its Water Surplus and Drought Management (WSDM) Plan, including a need to draw upon its storage to meet expected 2007 demands. MWD adopted its WSDM Plan in 1999 as guidance for managing regional water supplies during both surplus and shortage situations. MWD's announcement that it would need to draw upon its storage to meet demands triggered implementation of the Water Authority's WSDRP. The Water Authority began to implement a series of response measures identified in its WSDRP to reduce potential shortage impacts, starting with a call for voluntary conservation, and securing dry-year water transfers and storage programs for the region.

2009

As dry conditions persisted into 2009, the Water Authority and its member agencies intensified their drought response activities. In April 2009, for the first time in decades, MWD's Board voted to allocate urban water deliveries to its member agencies in fiscal year (FY) 2010. In turn, the Water Authority allocated water deliveries to its member agencies using the supply allocation methodology contained in the WSDRP. The Water Authority's long-term strategy to improve water supply reliability by diversifying the region's water

supply portfolio helped offset some of the required cutbacks from MWD. In order to ensure deliveries remained under the allocation target, many agencies went from voluntary conservation to mandatory water use restrictions. Residences and businesses responded to the call for conservation, and urban water use fell throughout San Diego County. Although hydrologic conditions began to improve in 2010, storage reserves remained low, and allocations continued into FY 2011 to help restore storage reserves and prepare for a potential dry water year.

2011

Supply conditions continued to improve throughout the winter and into the spring 2011. Storage water began to rise to levels seen before the start of the 2007 drought. In April 2011, MWD terminated water allocations to its member agencies. Subsequently, the Water Authority discontinued allocations to its member agencies and deactivated the WSDRP in April 2011. With the drought over and deactivation of the WSDRP, the Water Authority, in coordination with its member agencies, conducted an evaluation of the WSDRP, including the allocation methodology, based on lessons learned through implementation during the 2007-2011 shortage period.

Table 3-1 contains a timeline of significant drought and shortage-related events during the drought period of 2007 to 2011.

Table 3-1
Timeline of Significant Drought and Shortage-Related Events
(2007 – 2011)

April 2007	MWD announced it will need to draw from storage supplies to meet expected 2007 demands, consistent with Water Surplus and Drought Management Plan.
May 2007	Water Authority moved into Drought Management Plan Stage 1, Voluntary Supply Management (triggered by MWD withdrawal of storage supplies to meet expected 2007 demands). US District Judge Wanger invalidated US Fish and Wildlife 2005 Delta smelt biological opinion and orders a new biological opinion to be developed.
October 2007	MWD announced plans to reduce agricultural deliveries to customers participating in Interim Agricultural Water Program by 30%, effective January 1, 2008, consistent with WSDM Plan.
December 2007	Water Authority Board declared implementation of Stage 2, Supply Enhancement, of the DMP. Judge Wanger issues an interim order to direct actions at the export facilities to protect Delta smelt until a new biological opinion is completed.

January 2008	MWD implemented 30% cutback to Interim Agricultural Water Program participants, consistent with MWD's WSDM Plan.
February 2008	MWD approved its Water Supply Allocation Plan (WSAP).
March 2008	Water Authority released Model Drought Ordinance for use by member agencies that outlined potential mandatory use restrictions for retail customers under four levels.
April 2008	Water Authority notified member agencies of Drought Response Level 1, Drought Watch (up to 10% voluntary conservation), under Model Drought Ordinance (Stage 2 of DMP continued). Judge Wanger invalidated National Marine Fisheries Service biological opinion related to operations of the Central Valley Project (CVP) and SWP.
June 2008	Governor Schwarzenegger proclaimed statewide emergency due to drought and issued Executive Order S-06-08, that directed DWR to respond to drought conditions through a variety of actions, including facilitating water transfers and increasing conservation and outreach.
December 2008	US Fish and Wildlife Service released revised biological opinion on Delta smelt.
February 2009	Governor Schwarzenegger declared a statewide drought emergency on February 27.
April 2009	MWD announced allocation of M&I deliveries to its member agencies, including estimated 13% cutback to San Diego region for FY 2010. Water Authority Board enacted DMP Stage 3, Mandatory Supply Cutbacks, and Drought Response Level 2 (Drought Alert, up to 20% mandatory conservation), in anticipation of 8% cutback to its member agencies in FY 2010. Water Authority Board authorized utilization of approximately 16,000 AF of dry-year transfers acquired in 2009.

June 2009	National Marine Fisheries Service released final biological opinion and concluded that CVP and SWP pumping operations should be changed to protect the winter and spring run Chinook salmon, Central Valley steelhead, North American green sturgeon, and southern resident killer whales.
May 2010	Water Authority Board voted to continue DMP Stage 3, Mandatory Cutbacks, and Drought Response Level 2.
March 2011	Governor Brown proclaimed an end to the state's drought.
April 2011	MWD terminated implementation of its WSAP and IAWP supply cutbacks. Water Authority discontinued M&I water supply allocations to member agencies, deactivated Water Shortage and Drought Response Plan (formerly DMP), suspended special agricultural water rate cutbacks, and declared an end to drought response levels contained in Model Drought Ordinance.

3.2 Significant Drought and Shortage-Related Events (2014 to 2017)

2014

In January 2014, Governor Brown proclaimed a state of emergency throughout California, calling for increased conservation across the state. In response to the governor's drought declaration and call for conservation, the Water Authority activated its WSDRP for the second time since its adoption in 2006, declaring in February 2014, a regional drought response Stage I, Voluntary Supply Management, and notifying the member agencies of a voluntary Drought Watch condition under the Model Drought Ordinance. The Water Authority recognized that voluntary measures to reduce water use would be instrumental in helping preserve critical water reserves should dry conditions continue.

As drought conditions intensified across the state, with smaller communities in the Central Valley at risk of significant water supply shortages, in April 2014, the governor directed the SWRCB to adopt emergency regulations to prevent "the waste and unreasonable use of water," calling for a voluntary 20% reduction in urban water use statewide. In July 2014, the SWRCB adopted an emergency regulation for urban water conservation aimed at reducing outdoor water use, which established prohibitions on water waste and identified actions local water agencies should take to reduce water demand in their service areas. Consistent with the governor's call for statewide conservation, in July 2014, the Water Authority increased the regional drought response to Stage II, Supply Enhancement, and Drought Alert under the regional Model Drought Ordinance, which includes mandatory water-use restrictions with a

regional savings target of up to 20%.

2015

Dry conditions continued to worsen into a fourth year in the spring of 2015, as reflected by a record low level of snow water content in the northern Sierra Nevada of 5% of average for April 1, the date that usually marks the maximum accumulation of snowpack before it begins to melt. On April 1, 2015, the governor directed the SWRCB to impose restrictions on urban suppliers to achieve a statewide reduction in potable urban use of 25%. Following this direction, in May 2015, the SWRCB amended and readopted its emergency regulation to require a 25% reduction statewide in overall potable water use effective June 2015 through February 2016. The regulation included water conservation standards for retail urban water suppliers based on a reduction in water use that varied between 4 and 36% depending on residential gallons per capita per day (GPCD), compared with 2013 water-use levels. This marked the first time in California's history that conservation measures were mandated statewide to respond to drought conditions.

In April 2015, MWD's Board announced that it would implement its WSAP, calling for a 15% cutback in FY 2016 deliveries in its service area. In response to these cutbacks and the SWRCB emergency regulation, in May 2015, the Water Authority declared the Mandatory Supply Cutback stage under its WSDRP and approved member agency M&I and TSAWR supply allocations for FY 2016. The Water Authority member agencies also were required to limit outdoor irrigation of ornamental landscapes and turf with potable water to no more than two days per week.

An important element to drought response planning is determining the regional shortage level based on available supplies and projected demands. This analysis was conducted in 2015 for FY 2016, based on the supply allocation from MWD. The MWD supply allocation was combined with member agency dry-year local supplies, supplies from the Water Authority's Colorado River transfers of conserved water, and deliveries from the Lewis Carlsbad Desalination Plant. The total supplies available were calculated as 521,000 AF. Normal water demands were calculated for FY 2016 based on FY 2014 demands. The analysis showed a projected shortage of less than 1% for the region, which demonstrated that the planning and actions taken by the Water Authority and its member agencies are effective in managing severe multi-year droughts. Unfortunately, the SWRCB emergency regulation did not take into account the supplies water agencies had available during the drought and the required agency reduction levels did not reflect the supply reliability investments agencies had made to avoid or mitigate shortage due to drought.

Under the SWRCB's May 2015 emergency regulation, the Water Authority member agencies were required to reduce their monthly water use on a cumulative basis starting June 2015 through February 2016, by 12 to 36% compared to 2013 water-use levels, for a total aggregate region-wide reduction in water use of 20%. The San Diego region effectively reduced its cumulative potable water use by 21% from June 2015 through February 2016, outperforming the state's aggregate regional target of 20% during the initial phase of unprecedented state water-use mandates.

In November 2015, the governor issued EO B-36-15, extending the regulation until October 2016 and directing the SWRCB to consider modifications to the regulation. The Water Authority advocated for revisions to the regulation that take into account investments in drought resilient supplies.

2016

In February 2016, the SWRCB amended the emergency regulation to allow for adjustments to the conservation standards, including for new local drought-resilient supplies developed after 2013. In March 2016, the SWRCB certified supply from the Lewis Carlsbad Desalination Plant as drought-resilient, which lowered the range of member agencies' conservation standards to between 8% and 28%, with the regional aggregate water conservation goal reduced from 20% to approximately 13%. Under the regulations, a water supplier's conservation standard required at least an 8% reduction in water use, regardless of supply availability.

California's supply conditions improved somewhat during the winter of water year 2016, with an El Niño weather pattern bringing rain and snow to parched California. In March 2016, the Water Authority Board revised its regional drought management actions, rescinding its declaration of a regional Level 2 Drought Alert condition under the Model Drought Ordinance, recognizing that the SWRCB individual water supplies conservation standards are driving member agency-specific, rather than regional, water-use restrictions.

In May 2016, due to the improved supply conditions and sufficient supply availability, MWD terminated its member agency allocations. The Water Authority then ended allocations to its member agencies, consistent with the WSDRP. Also in May 2016, the SWRCB adopted an emergency regulation that replaced the prior percentage reduction-based water conservation standard with a localized "stress test" approach. The Water Authority and its member agencies advocated for the stress test approach since it took into account local supply investments and actual shortages being experienced within a community. Utilizing the conservative stress test criteria, the Water Authority and its member agencies demonstrated the availability of adequate supplies to meet demands for the years 2017, 2018, and 2019, should dry conditions continue.

2017

In January 2017, supported by the results of the self-certification stress test analysis and improved statewide water supply conditions that bolstered and enhanced the analysis, the Board adopted Resolution No. 2017-01, declaring an end to drought conditions in San Diego County.

Despite objections by the Water Authority and other water suppliers throughout the state, the SWRCB, in February 2017, re-adopted and extended the emergency regulation for another 270 days or until the Governor rescinded or modified the drought declaration. The action maintained the stress test approach and kept in place existing water use reporting requirements and prohibitions on wasteful water use practices. In April 2017, Governor

Brown issued Executive Order B-40-17, which lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne. The action ended the statewide emergency drought proclamation put in place by the Governor in January 2014. Through establishment of its drought awareness effort, the Water Authority continued its messaging and outreach to residents and businesses to ensure an ongoing community commitment to water-use efficiency across the region.

Table 3-2 contains a timeline of key events during the statewide drought emergency declared by the Governor in January 2014 and ended in April 2017.

Table 3-2
Timeline of Significant Drought and Shortage-Related Events
(2014 – 2017)

January 2014	Governor Brown declared a state of emergency throughout California due to severe drought and called for increased voluntary conservation to reduce water use by 20%.
February 2014	Water Authority notified member agencies of a Level 1, Drought Watch condition, under the regional Model Drought Ordinance, and declared implementation of Stage I, Voluntary Supply Management, under WSDRP.
April 2014	Governor Brown issued a proclamation that the drought emergency continues in California and called for an increased statewide conservation.
July 2014	SWRCB adopted emergency regulation for statewide urban conservation. Water Authority notified member agencies of a Level 2, Drought Alert condition, under the regional Model Drought Ordinance, and declared implementation of Stage II, Supply Enhancement, under WSDRP.
December 2014	MWD revised its WSAP.
April 2015	Governor Brown issued Executive Order B-29-15, instituting emergency actions and mandatory water-use restrictions for California. MWD imposed Level 3 under its WSAP, effective July 2015, reducing MWD supplies by 15%.

May 2015	SWRCB issued additional requirements to its emergency regulation, including mandatory water-use reductions that ranged from 12 to 36% for Water Authority member agencies with an aggregate water conservation target of 20%. Water Authority declared implementation of Stage III, Mandatory Supply Cutback, under WSDRP, adopted Ordinance No. 2015-02, allocating M&I and TSAWR supplies to its member agencies and requiring member agencies to restrict irrigation of ornamental landscapes and turf with potable water to no more than two days a week.
November 2015	Governor Brown issued Executive Order B-36-15 calling for extensions of urban water use restriction through October 2016, should drought conditions persist through January 2016, and directs SWRCB to consider modifying restrictions.
February 2016	SWRCB extended the emergency regulation through October 2016, and provides for adjustments to conservation standard for significant investment in new, local, drought-resilient sources of potable supply, climate differences and growth.
March 2016	SWRCB certified supplies from the Lewis Carlsbad Desalination Plant are drought-resilient, reducing member agency conservation standards to a range of 8 to 28% with a regional aggregate water conservation target of 13%. Water Authority modified its shortage management actions, adopting Ordinance No. 2016-01 and rescinding Ordinance No. 2015-02. Actions include continuing to allocate supplies to its member agencies in FY 2016 under its WSRP Stage III, Mandatory Supply Cutback, but rescinding the July 2014 notification of a regional Level 2, Drought Alert condition.
May 2016	Governor Brown issued Executive Order B-37-16. MWD rescinded its member agency allocations. Water Authority modified its shortage management actions, rescinding Ordinance No. 2016-01, to end member agency allocations, and establish a drought awareness effort. SWRCB modified its emergency regulation from a mandated conservation standard to a self-certification approach, effective June 2016 through January 2017.
January 2017	Water Authority Board adopted Resolution No. 2017-01, declaring an end to drought conditions in San Diego County.
February 2017	SWRCB re-adopted and extended the emergency regulation for another 270 days or until the Governor rescinds or modifies the drought declaration.

April 2017	Governor Brown issued Executive Order B-40-17, which lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne.
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3.3 Lessons Learned

As noted at the beginning of Section 3, the Water Authority has activated its shortage management plan twice since 2006. The first time, in 2007 when it was named the DMP, was in response to MWD's withdrawal of storage to meet demands. The DMP was active for approximately four years and deactivated in 2011. The second time the shortage management plan was activated was in 2014 when it was named the WSDRP. The plan was activated in response to the Governor's declaration of a state of emergency due to severe drought conditions, as well as in response to drought response actions being considered at MWD. The WSDRP was deactivated in 2016. In both instances, the region was able to smoothly and successfully transition into and out of allocations. This is a reflection of the comprehensiveness of the documents and coordinated effort that went into preparation of the documents. Because activation of the previous two versions of the shortage management documents were successful, the WSCP retains the same allocation methodology and many of the same elements included in the DMP and WSDRP. However, the 2020 WSCP also includes new elements required under the Water Code as a result of the passage of SB 606.

In addition to the successful activation and deactivation of the DMP and WSDRP, the advanced planning and foresight shown by the Water Authority and its member agencies after the drought in the early 1990s prepared the region to withstand the recent drought conditions. In fact, the water supply diversification strategies implemented by the Water Authority and its member agencies, combined with more than 25 years of aggressive water use efficiency programs, ensured sufficient water supplies for the region during the 2014-2017 drought period. As a result of being prepared for drought conditions, the Water Authority's member agencies were not assigned a conservation standard under the state's "stress test" methodology which was used to calculate a water supplier's water conservation standard. The benefits of supply diversification and water use efficiency will continue to be promoted by the Water Authority and its member agencies as methods to mitigate the impacts from drought conditions.

In the area of communication, past droughts have shown that clear and effective communication between the Water Authority, its member agencies, the public, and other stakeholders is critical to successful management of drought conditions. There are challenges associated with maintaining clear and effective communication. In some instances, the diversity between the Water Authority's member agencies can limit the scope of region-wide messaging since the messaging by individual member agencies may differ. In addition, the region can be subject to messaging from MWD that is designed to target MWD's entire service area, rather than just the San Diego region. Furthermore, previous state-wide campaigns such as "Save Our Water" may also have led to public confusion since the severe drought conditions

that exist in other regions of California did not exist in the San Diego region. Information on the WSCP's communication plan can be found in Section 9.

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Section 4

Annual Water Supply and Demand Assessment

Beginning in the 1990s, the Water Authority and its member agencies started to develop a diverse portfolio of water supplies to mitigate against potential water supply shortages. These supplies include core supplies, such as seawater desalination, and supply augmentation projects, such as carryover storage. Despite the development of a diverse water supply portfolio, supply uncertainties may still exist at times, but are primarily associated with the availability of imported supplies from MWD. The supply risks are the result of factors such as climate change, drought, and regulatory permitting.

Water Code §10632(a) requires an annual water supply and demand assessment (annual assessment) be conducted to ensure that the Board, member agencies, the public, and state and local agencies are informed as to the region's water supply conditions and the likelihood of water shortages. By July 1 of each year, the results of the annual assessment, including information on an anticipated shortage, triggered shortage response actions, compliance and enforcement actions, and communication actions, must be submitted to DWR in the form of an annual water shortage assessment report. This section describes the decision making process and methodologies used to perform the annual assessment. The annual assessment focuses on the demand and supplies available to M&I customers. The availability of water supplies associated with the Water Authority's PSAWR Program is discussed in Section 4.3.

The annual assessment is conducted in steps to determine if a regional customer demand reduction is needed, and if so, identify the appropriate shortage response level and actions (discussed in Section 5). It is important to note that if it is determined that a regional shortage response level exists, the actual response level of each member agency may differ slightly depending on the availability of their local supplies. An overview of the basic steps of the annual assessment process are outlined below, and in more detail in Sections 4.1 through 4.4. The annual assessment covers the current year and one dry year.

1. Annual Water Supply and Demand Assessment

- a. Evaluate the Water Authority's core water supplies and member agency demands on the Water Authority to determine if there is a water supply shortfall. Consider locally applicable factors and infrastructure capabilities and constraints that could influence supply.
- b. Evaluate management and potential utilization of carryover storage reserves based on the Board's adopted CSPG (See Appendix A) and determine if additional supply augmentation is required to mitigate a potential water supply shortfall.

2. Calculation of Regional Shortage Level

- a. If a water supply shortfall exists after the analysis of Water Authority supplies, calculate the regional shortage level considering total demands and both Water Authority and member agency supplies.

4.1 Assessment of Water Authority Supplies and Demands

This section describes the assessment to evaluate the Water Authority's M&I supplies and projected water demands. The assessment is used to determine if there is a shortfall in Water Authority supplies for the current year and one dry year. If the assessment identifies a shortfall in Water Authority supplies, the supplies available could be allocated based on the allocation methodology in Section 7.

4.1.1 Water Authority Core Water Supplies

The Water Authority's core water supplies that are considered as part of the annual assessment are described below. The core supplies include water supplies from the Lewis Carlsbad Desalination Plant, the Quantification Settlement Agreement (QSA), and MWD. The capabilities and constraints of the infrastructure to deliver the core water supplies are considered as part of the annual assessment.

Claude "Bud" Lewis Carlsbad Desalination Plant

The Lewis Carlsbad Desalination Plant, located at the Encina Power Station in Carlsbad, began commercial operation in December 2015, and provides a highly reliable local treated water supply of up to 56,000 AF/YR. Of the total Lewis Carlsbad Desalination Plant annual production of 48,000 to 56,000 AF/YR, 6,000 AF/YR is considered a member agency local supply.

Quantification Settlement Agreement

In 2003, as part of the execution of the QSA, the Water Authority contracted for 77,700 AF/YR of conserved water from projects to line the AAC and CC. The water is considered Priority 3(a) water and has a higher priority than that of several other water users on the Colorado River, including MWD. Also in 2003, the Water Authority and Imperial Irrigation District (IID) executed an amendment to a 1998 transfer agreement that makes Colorado River water that is voluntarily conserved by Imperial Valley farmers available to the Water Authority. The amendment modified certain aspects of the transfer agreement to be consistent with the terms and conditions of the QSA and related agreements. The volume of water annually available to the Water Authority through the transfer agreement reached its peak of 200,000 AF/YR in 2021.

Metropolitan Water District of Southern California

Under normal conditions, MWD is able to meet the Water Authority's supplemental water needs. However, during drought conditions, MWD may implement its WSAP and allocate water to its member agencies. Under MWD's WSDM Plan, MWD is scheduled to inform its member agencies, including the Water Authority, in April of any potential cutback for the

coming fiscal year and if necessary, the agency's allocation. That information is factored into the Water Authority's annual assessment.

4.1.2 Member Agency Projected Water Demands on the Water Authority

Demand for water in the Water Authority's service area falls into two classes of service: M&I and PSAWR demand. The WSCP's annual assessment considers only M&I water use, which encompasses a wide range of water uses, including residential demand (water used for human consumption in the home, domestic purposes, and outdoor residential landscaping) and water used for commercial, industrial, and institutional (CII) purposes.

Short-term water use trends in the region are closely linked to the economy and weather. Over the last several decades, economic growth cycles stimulated local development, which in turn, produced an increase in water demand. However, various factors, including MWD supply allocations, implementation of member agency mandatory water-use restrictions, an extraordinary conservation ethic, and state-mandated emergency water regulations resulted in a decrease in water demand. To project M&I water demands on the Water Authority for the annual assessment, the Water Authority uses a short-term forecast model that considers multiple variables, including historic water demand patterns, weather, local economic index, and anticipated conservation levels. Demand on the Water Authority is also influenced by member agency local supply levels which may be influenced by weather and other factors.

4.1.3 Supply Augmentation

If a water supply shortfall is identified based on the assessment of core water supplies and projected water demands, the next step is to evaluate the use of stored water reserves from the Water Authority's Carryover Storage reserves or to pursue additional supply augmentation measures, such as dry-year transfers, to reduce or eliminate the shortfall. If a shortage doesn't exist, consistent with the CSPG, Water Authority staff will analyze how to most effectively manage storage supplies to avoid potential shortages in the future. The Water Authority's supply augmentation programs and projects are discussed below.

Water Authority Carryover Storage Reserves

To more effectively manage supplies and increase reliability during shortage periods, the Water Authority invested in carryover storage. With carryover storage capacity, the Water Authority can store water for use during times of drought, or to avoid or minimize the impact of supply shortages. Carryover storage provides the following three benefits to the region during a supply shortage:

1. *Enhanced reliability of the water supply* - During dry weather periods, increased regional demand for water may exceed available supplies, resulting in potential water shortages. Carryover storage provides a reliable and readily available source of water during periods of shortage.

2. *Increased system efficiency* - Carryover storage provides operational flexibility to serve above normal demands, such as those occurring during peak summer months or extended droughts, from locally stored water rather than by the over-sizing of the Water Authority's imported water transmission facilities.

3. *Improved management of water supplies* - Carryover storage allows the Water Authority to accept additional deliveries from its existing SWP- and Colorado River-derived sources during periods of greater availability, such as during wet years. This results in more water available locally during periods of shortage.

The Water Authority's carryover storage includes surface water storage in the San Vicente Reservoir. In December 2002, the Water Authority's Water Facilities Master Plan identified the need for approximately 100,000 AF of carryover storage to assist in maintaining a secure and reliable water supply for the region during shortage periods. The San Vicente Dam Raise CSP meets that need by providing approximately 100,000 AF of local storage capacity, thereby facilitating the reliable and efficient delivery of water to residents in the Water Authority's service area during times of shortages. Construction of the San Vicente Dam raise was completed in 2014. By June 2016, the carryover pool was filled to its target storage level of 100,000 AF, although storage levels may vary throughout the year due to operational needs.

The Water Authority's carryover storage also includes out-of-region groundwater storage in California's Central Valley. Following a Request for Proposal process in 2008, the Water Authority executed a groundwater banking agreement with Semitropic-Rosamond Water Bank Authority to store and recover water in its groundwater basins. The Water Authority also acquired storage rights in Semitropic's Original Water Bank through an acquisition of Vidler Water Company's storage rights. The Central Valley out-of-region groundwater agreements provide 70,000 AF of storage capacity, with more than 9,000 AF/YR of put capacity and more than 14,000 AF/YR of recovery capacity. These rights expire December 31, 2035, unless the agreements are renewed.

Utilization of Carryover Storage Supplies

In December 2016, the Board approved CSPG to provide policy guidance on how the Water Authority's carryover storage supplies should be managed during supply shortage events and normal (non-shortage) periods to help minimize or avoid potential cutbacks to member agencies during drought. The CSPG are included in Appendix A.

Water Authority's Dry-Year Transfer Program

To ensure adequate water supplies during drought conditions and periods of regulatory constraints, the Water Authority may consider securing water transfers as part of its WSCP. Considerations on whether to pursue transfers are based on a range of factors, such as source location, federal and state agency approvals, price, call period, and capacity in the SWP system.

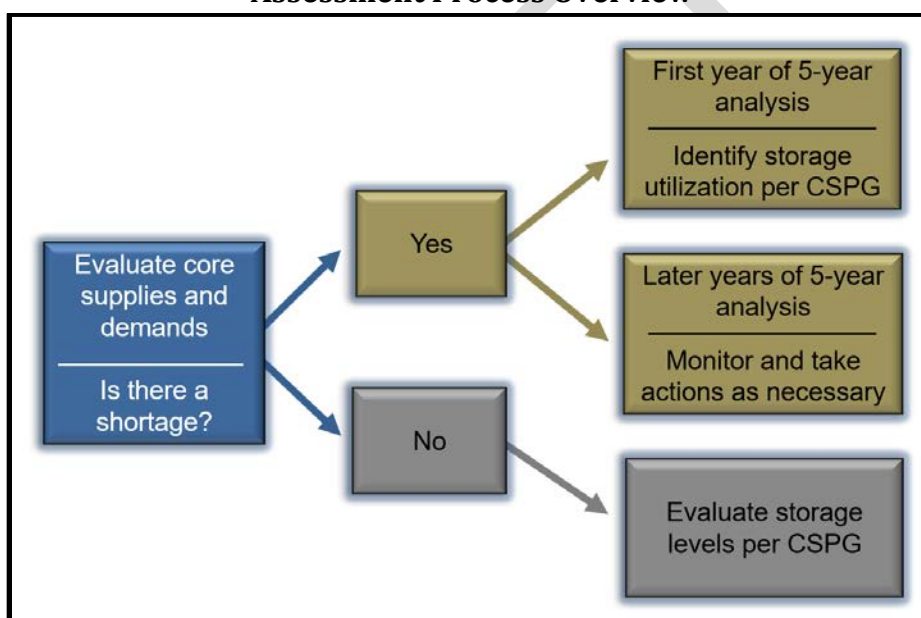
As an example, to lessen the impact of shortages during the 2007–2011 drought, in 2009, the Water Authority acquired 20,000 AF of water under a one-year transfer agreement with

Placer County Water Agency in Northern California to lessen the impact of water supply reductions on the San Diego region. The transfer eased the region's transition from voluntary conservation to mandatory water-use restrictions by keeping the regional water savings target for the year at a manageable level.

The Water Authority did not pursue transfers during the 2012 - 2017 drought for a number of reasons, including the ability of the Water Authority and its member agencies to manage the drought with the current available supplies. In addition, securing dry-year transfers with the SWRCB's May 2015 emergency regulation in place would not have alleviated the state-mandated cutback levels. Supply availability was not taken into account when the state established the reduction mandates.

Figure 4-1 provides an overview of the assessment process to evaluate the Water Authority's core supplies, demands on the Water Authority, and management of carryover supplies.

**Figure 4-1
Assessment Process Overview**



CSPG = Carryover Storage Policy Guidelines

4.2 Regional Reliability Assessment Calculation

If a regional water supply shortfall still exists after consideration of augmented supplies, the next step is to calculate a regional shortage level at the customer level in order to identify the appropriate M&I shortage response actions. The potential M&I shortage response actions are listed in Section 5. The regional shortage level is calculated by projecting total water demands within the Water Authority's service area and comparing these demands to the available Water Authority and member agency water supplies. As part of the assessment, the Water Authority will contact the member agencies to confirm and determine the appropriate local supply figures to use in the assessment. This includes supplies such as surface water,

groundwater, potable reuse water, and non-potable recycled water. *It is important to note that this assessment calculates a regional shortage response level, but the actual shortage response level of each of the member agencies may differ depending on the amount of local supplies available to that member agency.*

4.3 Permanent Special Agricultural Water Rate Program

The Water Authority Board, in September 2020, approved the PSAWR Program and made it available to eligible customers effective January 1, 2021. As a condition of PSAWR Program participation, PSAWR deliveries to the member agencies are exempt from the Storage Charge calculation. In return, agricultural customers receive half the M&I level of service under the ESP and no deliveries under the CSP. The cutback to PSAWR deliveries during a shortage is equivalent to the cutback level from MWD. During the last drought, under the SWRCB May 2015 emergency regulation, urban commercial agriculture was exempt from the emergency conservation mandates, consistent with how the agricultural sector was treated throughout the state. Per PSAWR Program guidelines, program participants would still be required to cutback consistent with the Water Authority's cutback level from MWD.

4.4 Water Supply and Demand Assessment Timeline

To ensure an accurate annual assessment of regional water supply and demand conditions, up-to-date data on supply availability from both the Water Authority's member agencies and MWD is utilized. In addition, information on local and statewide hydrologic conditions, as well as other factors, is considered as part of the assessment.

The process to complete the assessment by July 1 of each year begins in April, with Water Authority staff coordinating with the member agencies to gather the necessary information to conduct the assessment. The information collected includes the member agencies' projections for production of local supplies, such as recycled water (potable and non-potable), groundwater, and surface water. Water Authority staff also monitors imported water supply conditions, including the status of QSA deliveries and the potential for supply allocations from MWD. According to the schedule in MWD's WSDM plan, member agencies will generally be notified of any potential allocations in the April time frame when the outlook for imported supplies is known to a fairly high degree of certainty. Based on the results of the assessment, Water Authority staff may recommend an appropriate regional shortage response level for Board consideration to effectively manage the supply situation. It should be noted that this timeline serves as a guideline for preparing the annual assessment and could be modified based on circumstances relevant at that time.

Section 5

Regional Shortage Response Actions and Levels

Section 4 discussed the annual assessment that is used to determine the current regional supply situation for the San Diego region and if any shortage is anticipated. Based on the annual assessment, a water shortage level may need to be activated. If a water supply shortage is identified, this section provides information on the regional water shortage levels and response actions associated with the water supply situation. This section also discusses the water supply conditions that could trigger a specific regional water shortage level. Included is a description of the percent reduction required at each level and whether it is voluntary or mandatory.

5.1 Regional Shortage Levels and Response Actions

In times of potential water supply shortages, the Water Authority needs to take actions to try to reduce and eliminate the shortage. The Shortage Response Matrix provides guidance to the Board to select potential regional actions to lessen the existing or future severity of water supply shortages. The matrix includes a list of potential shortage response actions available to the Water Authority at each of the six levels. The six levels and percent reductions are consistent with the six levels required under SB 606. The Shortage Supply Matrix is shown as Figure 5-1.

Figure 5-1
Shortage Supply Matrix

Regional Water Shortage Levels ²	Potential Water Authority M&I Shortage Response Actions ¹					
	Ongoing Water Use Efficiency	Communication Plan	Supply Augmentation		Call for Extraordinary Demand Reduction Measures	Member Agency M&I Supply Allocation
			Storage Withdrawals	Spot Transfers, Other		
Normal Conditions	✓					
<u>Level 1</u> Up to 10% (Voluntary)	✓	✓	✓			
<u>Level 2</u> Up to 20% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 3</u> Up to 30% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 4</u> Up to 40% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 5</u> Up to 50% (Mandatory)	✓	✓	✓	✓	✓	✓
<u>Level 6</u> Above 50% (Mandatory)	✓	✓	✓	✓	✓	✓

¹ The matrix contains potential Water Authority regional actions. The member agencies can implement local jurisdiction regulations as necessary for their service areas.

² The response to a catastrophic emergency could occur under any response level. Potential Water Authority shortage response actions include activation of the Integrated Contingency Plan and allocation of Emergency Storage Program supplies.

The reduction levels are defined as “up to” or “above” a specified percentage to provide more flexibility for the member agencies to establish the appropriate local reduction level should their reduction not equate exactly to the regional number. As mentioned in Section 4, the regional percent reduction may differ slightly from a member agency’s regional percent reduction depending on the amount of local supplies available to that member agency.

To determine the specific actions that should be taken at each level, the Water Authority and its member agencies will evaluate conditions specific to the timing, supply availability, and cost, along with other pertinent variables. Numerous variables can influence the supply reduction levels during a water supply shortage. These variables include, but are not limited to, SWP allocation, conditions on the Colorado River, Water Authority supplies, local storage, local demands, and timing. Member agencies will independently adopt retail-level actions to manage potential water supply shortages.

Depending on the situation, the Board may not implement each of the identified actions in a response level, but select only those that are appropriate. For example, at Level 2, the matrix lists six actions the Board could consider adopting, but based on local and statewide supply

conditions, would only decide to implement four of the actions. In addition, the Board may adopt additional actions not listed in the matrix. This occurred during the 2014-2017 statewide drought, when the SWRCB instituted emergency conservation mandates for urban retail water suppliers statewide, regardless of local supply conditions (see Section 3). In the future, should the state mandate emergency conservation standards that would require the Water Authority to deviate from the process outlined in the WSCP, extensive collaboration would occur with the member agencies to develop recommended regional actions for Water Authority Board consideration.

The following is a brief description of each of the potential shortage response actions in the Shortage Response Matrix.

Ongoing Water Use Efficiency

The Water Authority and its member agencies continuously promote water use efficiency, regardless of water supply conditions. Water use efficiency measures target all sectors of water users. Over the last several years, the focus of water use efficiency efforts shifted from indoor to outdoor water conservation due to 25 years of indoor water conservation activities. Those activities included retrofits of indoor plumbing devices and audits to identify inefficient practices. More recent activities included landscape retrofits that are the result of market transformation efforts and outreach campaigns such as the Water Authority's "Live WaterSmart" campaign. Ongoing water use efficiency efforts will be coordinated with the Communication Plan and will take place throughout all regional response shortage levels.

Communication Plan

The Communication Plan will be in place prior to a water supply shortage and be initiated in Level 1 of the Shortage Response Matrix. Activation of the Communication Plan will continue through all subsequent levels of the matrix and be coordinated between the Water Authority and its member agencies. Refer to Section 9 for additional information on the Communication Plan.

Supply Augmentation

Supply augmentation can be initiated under Level 1, and can include storage withdrawals, spot transfers, and other actions. As discussed in Section 4, the Water Authority may withdraw water from its carryover supplies in accordance with the CSPG. At the Board's discretion, storage supplies may be withdrawn from the ESP to mitigate severe shortages. Supply augmentation also includes transfer option contracts for supplies from outside of the region. Transfer options are multi-year contracts that allow the Water Authority to obtain a specified quantity of water at a future date. The amount of water secured will depend on the supply shortage, availability of supply, and cost. A minimum payment for water is usually required in order to secure the transfer. This payment must be made even if the water is not needed. The Water Authority may also buy spot transfers from outside of the region. Spot transfers make water available for a limited duration (typically one year or less) through a contract entered into in the same year that the water is delivered. Additional information on supply augmentation is available in Section 4.

Call for Extraordinary Demand Reduction Measures

Extraordinary demand reduction measures are those measures that reduce water customers'

demand beyond the reductions that result from ongoing water use efficiency activities. They are measures that could be implemented when the regional water shortage response level reaches Level 2 and a mandatory reduction in water use of up to 20% is required. An example of an extraordinary demand reduction measure is restrictions on outdoor water use. Implementation of the specific demand reduction measures would occur at the member agency level. Please refer to Section 6 for additional information.

Member Agency Municipal & Industrial Supply Allocation

Implementation of the Water Authority's M&I supply allocation methodology would be considered when a mandatory reduction in water use is needed (Level 2). Information on the supply allocation methodology can be found in Section 7.

5.2 Potential Response Level Triggers

Response level triggers vary depending on whether the regional water shortage response stage is voluntary or mandatory. For the voluntary level, the scenarios that could trigger a response include the likelihood of potential core supply shortages in the near-term or a shortage in core supplies that could be mitigated through carryover storage reserves. For mandatory levels, a potential scenario that could trigger a response is inadequate Water Authority core supplies to meet demands and supply augmentation does not fully mitigate a core supply shortage. In addition, the response to a catastrophic emergency could occur under any response level. The potential scenarios are summarized in Figure 5-2.

**Figure 5-2
Potential Response Level Triggers**

Regional Water Shortage Response – M&I Demand Reduction Level		Scenarios (As Documented in Reliability Analysis)
Voluntary	Level 1 – Up to 10%	<ul style="list-style-type: none"> ➤ Likelihood of potential core supply shortage in the near-term ➤ Shortage in core supplies, but mitigated through carryover storage reserves
	Level 2 – Up to 20%	<ul style="list-style-type: none"> ➤ Water Authority core supplies are not adequate to meet member agency demands ➤ Supply augmentation (i.e., utilize storage reserves and/or dry-year transfers)
Mandatory	Level 3 – Up to 30%	
	Level 4 – Up to 40%	
	Level 5 – Up to 50%	
	Level 6 – Above 50%	
Catastrophic Emergency		<ul style="list-style-type: none"> ➤ Occurs when a disaster, such as an earthquake or other emergency event, results in insufficient available water to meet the region's needs or eliminates access to imported water supplies

Section 6

Extraordinary Demand Reduction Measures

The main purpose of implementing extraordinary demand reduction measures during a supply shortage is to achieve a measurable reduction in water use to assist in managing a short-term supply shortfall. The shortage response matrix in Section 5 includes extraordinary demand reduction measures as a potential shortage response action. This section provides a brief discussion on demand reduction measures and the Water Authority's 2020 Model Drought Ordinance. It should be noted that the Water Authority, as a wholesale water supplier, does not implement demand reduction measures at the retail customer level, but can assist member agencies in communicating and educating the public regarding any potential measures.

6.1 Examples of Extraordinary Demand Reduction Measures

Demand reduction measures primarily consist of water conservation actions, but may include actions related to water use efficiency. The distinction between the two types of actions is that water conservation results in a reduction in water loss, waste, or use, whereas water use efficiency is the performance of ongoing water-related tasks with lesser amounts of water.² Appendix C includes a list of potential customer water use prohibitions that could be considered extraordinary demand reduction measures and used by the member agencies in their role as a retail water supplier.

6.2 Model Drought Ordinance

The Water Authority's Model Drought Ordinance focuses on core water use restrictions and is intended to assist the member agencies when updating local drought response ordinances and to provide regional consistency in drought response levels and messaging to the public and media. The use of the Model Drought Ordinance as a tool for member agencies helps provide consistency throughout the region which helps to reduce confusion among the public and media on the current response level and appropriate use restrictions.

Triggers that identify the actions required to initiate a certain drought response level are included in the Model Drought Ordinance, which takes into account the relationship between the Water Authority and its member agencies. A certain drought response level may apply when the Water Authority notifies its member agencies that a specific consumer demand reduction level is required. Factors that impact the demand reduction level include potential or actual cutbacks from MWD, the amount of member agency local supplies available, and the

² *Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16*. Final Report, April 2017. Page 1-7.

ability of the Water Authority or its member agencies to secure supplemental supplies. Based on an action by the Board and notification from the Water Authority, the member agency would declare the appropriate response level and implement water-use restrictions consistent with the declared response level.

In identifying examples of potential water-use restrictions that could be included in the Model Drought Ordinance, staff identified core restrictions that were common to the existing member agency ordinances and successfully employed by other agencies outside the region. Appendix C provides a list of additional water use prohibitions.

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Section 7

Municipal and Industrial Supply Allocation Methodology

7.1 Introduction

As outlined in the Shortage Supply Matrix discussed in Section 5.1, after the Board has exhausted available supply enhancement options and can no longer avoid cutbacks, implementation of an allocation methodology will occur. The challenge in developing the methodology was to meet the diverse needs of the member agencies in a fair and equitable manner. Each of the Water Authority's member agencies has a different demand profile and unique supply portfolio. Some agencies have abundant local supplies, while others are 100% reliant on water supplies purchased from the Water Authority. There are member agencies that serve primarily agricultural customers, while others serve only M&I customers.

This section includes a description of the M&I supply allocation methodology developed through a collaborative effort between the Water Authority and its member agencies. The goal of the methodology is to provide an equitable means of apportioning the Water Authority's supplies during periods of supply shortages consistent with the TAC approved principles discussed in Section 2.1.3. Through the TAC meetings, Water Authority staff and designated member agency representatives have collectively agreed to the allocation methodology described in this section. It should be noted that agricultural customers in the voluntary PSAWR program have a separate allocation methodology. In exchange for a cost-benefit rate differential, PSAWR customers are subject to higher cutbacks set at the MWD percent reduction level.

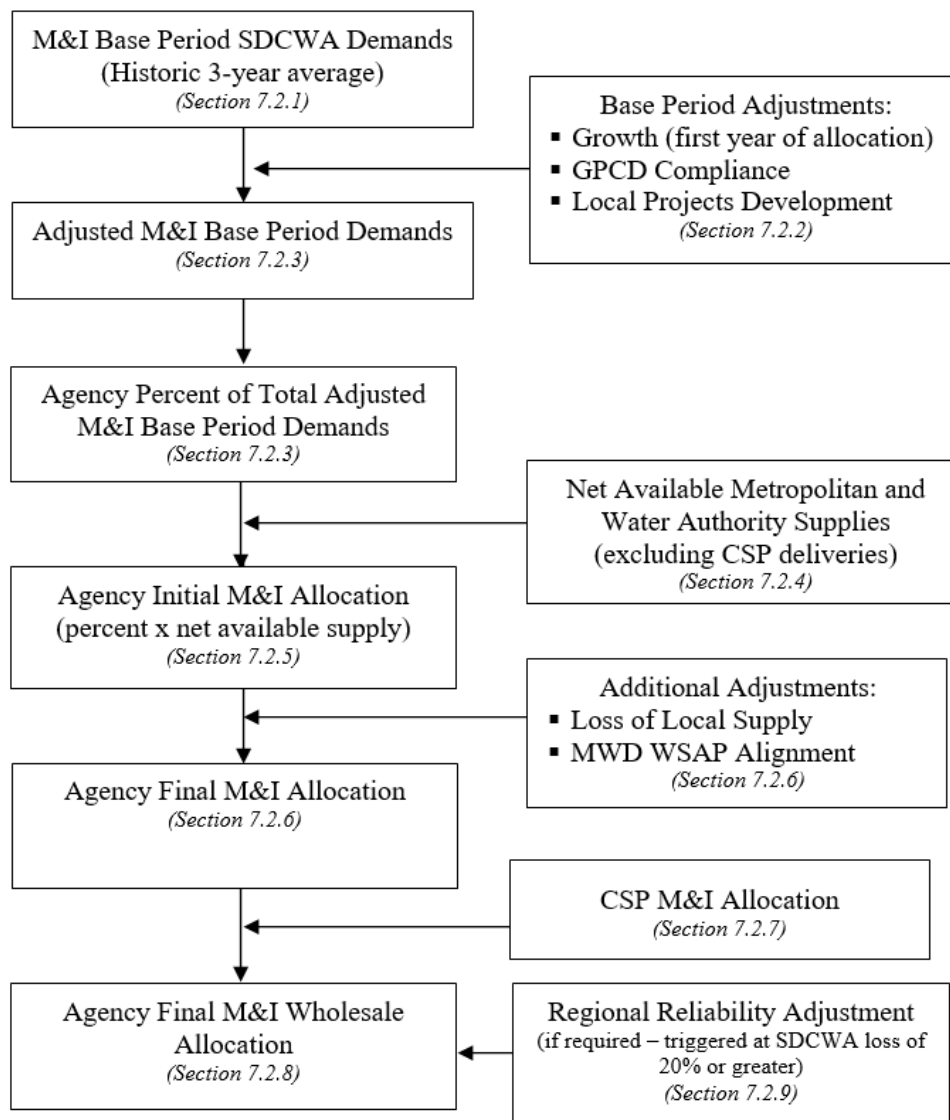
In evaluating implementation of the Water Authority's allocation methodology during the FY 2010 and FY 2011 cutback period, Water Authority and member agency staff identified specific elements of the methodology for review and refinement. As part of this effort, it was noted that certain conditions had changed since adoption of the methodology in 2006. Specifically, the adoption of SB X7-7 in 2009, caused a paradigm shift in conservation tracking and prompted an evaluation of the manner in which the allocation methodology addressed demand hardening and conservation savings. A final area of review involved the relationship between the Water Authority's methodology and modifications to MWD's WSAP. Alignment between the two allocation plans was necessary when methodological inconsistencies result in unintended and inequitable impacts to the region or a single member agency. On April 26, 2012, the Board approved modifications to the allocation methodology that were developed through the member agency review and refinement process.

To provide an overview of the allocation methodology that includes the April 2012 modifications, a schematic has been prepared that shows principal steps in the process. As shown in Figure 7-1, the methodology begins with a determination of each agency's base period M&I demands. From this base, adjustments are added to account for agency's growth

in demand, local projects development, and compliance with water use efficiency requirements. The calculation results in an adjusted base period demand for each member agency. Next, the amount of supplies available from the Water Authority is determined. This includes the Water Authority's own supplies (excluding Carryover Storage) along with supplies available from MWD. Individual member agency's percent share of the total regional adjusted base period M&I demand is then calculated. The percentages are multiplied by Water Authority supplies available to derive an initial M&I allocation for each member agency. To calculate agencies' final M&I supply allocations, additional adjustments are subsequently made for allocation-year local supply loss and for MWD WSAP alignment, if needed. If the Board elects to utilize carryover storage, a separate allocation for this supply is performed and results in a final total wholesale allocation. In the unlikely event of severe imported supply shortages, a regional reliability adjustment will be applied to avoid large uneven retail impacts. Each box shown in Figure 7-1 contains a reference number to the corresponding subsection that describes the step in detail.

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Figure 7-1
Supply Allocation Methodology



7.2 Description of M&I Allocation Methodology

To help describe the M&I allocation methodology and demonstrate the calculation procedures, the following example was developed. The example was prepared for illustration purposes only. For this sample analysis, demand and local supply data for five representative agencies was established to approximate a cross-section of characteristics unique to the region. Other agency attributes such as estimated growth, per capita use, and local supply availability were also based on local agency characteristics. Implementation of the allocation methodology would be considered when a mandatory reduction in water use is needed under Levels 2 through 6 of the Shortage Supply Matrix (see Section 5.1). For illustration purposes, an estimated 15% cutback in MWD supplies to the Water Authority was assumed.

7.2.1 Historic M&I Base Period M&I Demands on the Water Authority (Unadjusted)

A historic base period M&I demand is required to establish each agency's demands on the Water Authority prior to activation of the WSCP. Base period M&I demands are calculated using data from the three most recently completed consecutive fiscal years immediately preceding the year in which Board action is taken to activate the WSCP due to supply shortage conditions. Each of the three consecutive fiscal years will be years in which the WSCP has not been activated. Each agency's base period M&I demand is established by calculating its three-year average of demand on the Water Authority.

For illustrative purposes, Table 7-1 contains historic base period M&I demands for the sample agencies. In the event that consecutive multi-year allocations are required, base period demands (based on the three years prior to the activation of the WSCP) are to remain fixed for the duration of the allocation.

Table 7-1
Example
Historic Base Period M&I Demands on Water Authority (AF)

	Agency A	Agency B	Agency C	Agency D	Agency E
SDCWA M&I Demand (three-year average)	2,200	6,500	181,000	43,100	25,000

7.2.2 Adjustments

Adjustments applied to the base period were developed to equitably account for relevant factors in calculating each agency's allocation. Such factors include growth, compliance with water use efficiency requirements, local supply availability, and efforts taken by local agencies to develop reliable local projects such as recycled water, groundwater recovery, and seawater desalination. The adjustments are intended to acknowledge unique agency characteristics and provide an incentive for agencies to decrease their reliance on imported supplies over the long-term. The following is a summary of each adjustment:

Growth

Because the base period is fixed, a growth adjustment is applied to estimate the increase in demand due to growth from the base period to the allocation year. This adjustment is calculated using agency-level population estimates as a metric to approximate growth in demand. These population figures are based on San Diego Association of Governments (SANDAG) generated annual demographic totals. Each agency's demand increase is computed by multiplying its change in population by a per-capita water use efficiency factor (GPCD factor). The GPCD factor is an aggregate of member agencies' SB X7-7 GPCD targets from the Water Authority's UWMP and encompasses residential and CII demands. As an example, the 2010 UWMP contained an aggregated GPCD target of 174 GPCD for year 2015. The growth

adjustment calculation is expressed as:

$$= (\text{Change in Population}) \times (\text{Aggregated Member Agency GPCD Target})$$

However, if an agency's actual base period GPCD is less than the aggregated GPCD target, the lower value will be utilized as the water use factor in the growth calculation. This is done to ensure that the growth adjustment reflects efficient water use levels in the member agency's service area.

In the event that an agency experiences minimal or no population increase, an alternate growth adjustment calculation is available. To qualify, the agency must have sustained a growth rate of less than 50% of the regional population growth rate. As previously stated, SANDAG data will be utilized to determine each agency's growth rate and the regional growth rate. Under the proposed adjustment, CII growth would be captured through CII meter installations that occurred after the base period. Additionally, residential growth in demands would be captured by applying a water-efficient residential GPCD to the minimal population increase. Agencies requesting this method for capturing growth are required to provide adequate documentation on CII meter installations and residential GPCD factors based on their individual SB X7-7 targets.

Finally, to ensure alignment with MWD's WSAP, when necessary, in subsequent years of a multi-year allocation period the growth adjustment amount received from MWD will be passed through to Water Authority member agencies based on each agency's proportional share of Water Authority-wide population growth. The reason the Water Authority growth adjustment from MWD is not passed through to agencies in the first year, is because the two agencies' base periods would likely be different, making the time frame between the base periods and allocation years inconsistent. To again address the concern of agencies with minimal population growth and large CII increase, an agency can request CII meter installations be used, in part, as a basis for proportioning the growth adjustment received from MWD. The same criteria and documentation would be required as discussed above. Table 7-2 illustrates the growth adjustment calculations for each sample agency. *It is important to note that should the State adopt water use efficiency requirements that supersede SB X7-7, the growth adjustment will be updated to align with these new requirements.*

Table 7-2
Growth Adjustment

Member Agency Population

Population	Agency A	Agency B	Agency C	Agency D	Agency E
Final Year of Base Period	12,197	31,784	789,627	220,970	116,782
Allocation Year	12,300	32,400	808,100	233,300	117,500

Change in Population	103	616	18,473	12,330	718
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Governing GPCD Target

Agency	Base Period GPCD	Aggregated Agency SB X7-7 Target	Governing GPCD Target
A	176	174	174
B	186	174	174
C	200	174	174
D	165	174	165
E	187	174	174

Growth Adjustment

	Agency A	Agency B	Agency C	Agency D	Agency E
Governing GPCD Target	174	174	174	165	174
Population	103	616	18,473	12,330	718

Gallons (MG) **6.5** **39.1** **1,173.2** **742.6** **45.6**

Adjustment (AF) **20** **120** **3,600** **2,280** **140**

GPCD Compliance

With the state's adoption of the SB X7-7, retail agencies are currently required to implement water use efficiency measures that result in a 20% reduction in their per capita water use by the year 2020. In order to acknowledge the importance of meeting SB X7-7 targets, a water use efficiency adjustment is incorporated into the allocation methodology. The GPCD compliance adjustment applies only to agencies that fail to meet their SB X7-7 2020 targets, or estimated pre-2020 targets, over the Water Authority established allocation base period. Agencies not meeting their targets will have their SB X7-7 compliance shortfall deducted from their base period demand. Consistent with SB X7-7 guidelines, each agency's base period demand will be normalized for weather before comparison to its GPCD target.

However, to recognize agencies' efforts towards meeting their targets, an SB X7-7 target performance allowance is included as part of the adjustment. Under this allowance, an agency's base period demand would be reduced only if its GPCD exceedance is over 5% of its SB X7-7 target. GPCD compliance adjustments for the sample agencies are shown below in Table 7-3.

Table 7-3
GPCD Compliance Adjustment

	Agency A	Agency B	Agency C	Agency D	Agency E
Base Period GPCD (weather normalized)	176	186	200	165	187
SB X7-7 GPCD Target	178	174	210	170	180
Variance	-2	12	-10	-5	7
SB X7-7 Target					
5% Exceedance Allowance	N/A	183	N/A	N/A	189
Adjustment (GPCD)	0	3	0	0	0
Adjustment (AF)	0	117	0	0	0

It is important to note that should the State adopt water use efficiency requirements that supersede SB X7-7, the growth adjustment will be updated to align with these new requirements.

Local Projects Development

The development of highly reliable in-region supplies, such as brackish groundwater recovery, recycled water, and seawater desalination result in a dual benefit. They add to the region's supply diversity and are a dependable source during shortages of imported water. An adjustment is made for the regional benefit of these annually reliable supplies. The adjustment recognizes both the investment made by the local agency and the regional financial contribution made by the Water Authority. Similar to the M&I base period calculation time frame, a three-year average of beneficial use from these reliable supplies is employed to calculate the adjustment. The Local Projects Development adjustment is 30% of the three-year average. In addition to the incentive from the adjustment, the member agency will be able to utilize 100% of their local project's supply that is available during a drought. Table 7-4 on the following page shows the Local Projects Adjustment.

Table 7-4
Local Projects Development Adjustment (AF)

Year	Agency A	Agency B	Agency C	Agency D	Agency E
1	65	0	4,900	1,310	1,850
2	64	0	4,950	1,350	2,100
3	66	0	5,150	1,340	2,050
Average	65	0	5,000	1,333	2,000
30% Credit	20	0	1,500	400	600

7.2.3 Adjusted M&I Base Period M&I Demands and Supply Allocation Percentages

An agency's adjusted M&I base period M&I demand is calculated by adding the applicable adjustments to their initial M&I base period demand. The adjusted M&I base period demand

amount is then used to generate an agency's pro-rata percent share of the M&I adjusted base period demand. It is this percentage that is used to calculate an agency's initial imported supply allocation volume. Table 7-5 illustrates the calculation for the sample agencies.

Table 7-5
Adjusted M&I Base Period Demand and
Initial Supply Allocation Percentages (AF)

Agency	Base Period M&I Demand on SDCWA	Growth Adjustment	GPCD Compliance Adjustment	Local Projects Development Adjustment	Adjusted M&I Base Period M&I Demand	Pro-rata Share of Adjusted Base Period M&I Demand
A	2,200	20	0	20	2,240	0.80%
B	6,500	120	-117	0	6,503	2.40%
C	181,000	3,600	0	1,500	186,100	69.90%
D	43,100	2,280	0	400	45,780	17.20%
E	25,000	140	0	600	25,740	9.70%
Total					266,363	

7.2.4 Water Authority Supply Availability and Net Cutback Percentages

The next step in the allocation methodology is to identify the M&I supplies available to meet member agency M&I demands during shortage events. Supplies are equal to the sum of water from MWD, the Water Authority's IID transfer water, conserved water from planned canal lining programs, and supplies from the Lewis Carlsbad Desalination Plant. These additional supplies developed by the Water Authority help to reduce demands on MWD, and therefore decrease the impact from reductions in MWD's supplies. This is demonstrated in the calculations shown in Table 7-6.

For this example, it is assumed that MWD's allocation results in a drought supply allotment equal to 85% of the Water Authority's M&I demand on MWD. In the example, Water Authority supplies are conservatively set at 20,000 AF/YR. Actual Water Authority supplies are significantly higher than 20,000 AF/YR and include supplies from the Lewis Carlsbad Desalination Plant and the QSA. Total M&I supply availability is computed by combining Water Authority supplies and MWD drought supplies (Table 7-6). As discussed in Section 7.2.6, the loss of local supply adjustment requires a portion of the available supply to be set aside to implement the adjustment, the loss of local supply volume is shown in Table 7-8.

Table 7-6
M&I Supply Availability - illustrative purposes (AF)

M&I Supply Availability

Allocation-Year M&I Demand	273,360
SDCWA Supply	20,000
M&I Demand on MWD	253,360
MWD Cutback to M&I Supplies	15%
Net MWD M&I Supply Availability	215,356
Initial SDCWA M&I Supply Availability	235,356
Loss of Local Supply Adjustment Set Aside	4,700
Net SDCWA M&I Supply Availability	230,656

7.2.5 Member Agency Initial Allocation of Water Authority Supplies

The next step in the allocation methodology is to determine the initial member agency M&I level allocation of available M&I supplies. This is calculated by multiplying total M&I available supplies (excluding carryover storage) by each agency's percent share of the adjusted base period demand, as shown in the following equation:

$$= (\text{Net Available Regional Imported Supply}) \times (\text{Agency's Pro Rata Share of Base Period M\&I Demand})$$

For the example, data from Tables 7-5 and 7-6 are used to calculate allocations for the sample agencies. The results are shown in Table 7-7.

Table 7-7
Initial Imported M&I Supply Allocation Volumes

Agency	Pro-rata Share of Adjusted M&I Base Period SDCWA M&I Demands	SDCWA Initial M&I Allocation Volume (AF)
A	0.8%	1,845.2
B	2.4%	5,536
C	69.9%	161,228
D	17.2%	39,673
E	9.7%	22,374
<i>Total</i>	100.0%	230,656

7.2.6 Additional Adjustments

Loss of Local Supply

Some agencies have invested heavily in local supply development, thereby reducing their reliance on imported water and providing other regional benefits such as surface water treatment capacity. The loss of local supply adjustment was developed to recognize the benefit of these historic supplies and not penalize agencies for diminished local supplies during an allocation year. The adjustment is calculated as the difference between an agency's

average local supply used over the base period and its projected allocation-year local supply use. This difference is then reduced by the Water Authority cutback percentage from MWD. Loss of local supply during an allocation year, as used in this section, shall be deemed by the Water Authority to occur, or have occurred, where a member agency's locally produced source of water supply is lost or otherwise reduced as a result of drought/locally dry conditions, legislative and regulatory actions, court orders, water rights decrees and related settlements, the inability of the member agency claiming the adjustment to obtain contracted deliveries from a local water supplier, damage or loss of member agency infrastructure needed to produce, store, treat and convey local water supplies, or other circumstances where the member agency has lost the ability to utilize a local water supply through no fault of its own. The Loss of Local Supply Adjustment for the sample agencies is shown in Table 7-8.

Member agency developed local water supplies subject to adjustment under this provision include, but are not limited to, locally produced surface water, groundwater, desalinated ocean or brackish water, recycled water, captured stormwater or any other locally produced source of water that satisfies the potable or non-potable demands of a Water Authority member agency during the allocation year where a loss of local supply adjustment is sought. It is critical that the agency claiming a potential local supply loss adequately document the actual loss for the year end reconciliation when financial penalties for exceeding allocation targets are assessed.

While recycled, brackish groundwater, and seawater desalination supplies are eligible for the Loss of Local Supply Adjustment, doing so will preclude an agency from applying for the Local Projects Development Adjustment described in the Section 7.2.2 on this same supply.

Table 7-8
Loss of Local Supply Adjustment

<i>Base Period Local Use</i>					
Year	Agency A	Agency B	Agency C	Agency D	Agency E
1	0	0	19,700	0	2,000
2	0	0	21,800	0	3,900
3	0	0	18,500	0	2,500
Average	0	0	20,000	0	2,800
Allocation Year Local Supply	0	0	15,346	0	1,925
Difference (less 15% MWD Cutback)	0	0	3,956	0	744

Metropolitan WSAP Alignment

The WSCP allocation methodology also contains adjustments necessary to align it with MWD's WSAP to ensure equitable supply allocations to Water Authority member agencies. In December of 2008, the Board approved alignment modifications that dealt with agencies adding planned local supplies and extraordinary increases in production during consecutive allocation years. The modifications were made because, due to increases in certain member

agency local supplies, the Water Authority would have been allocated less water by MWD and the net effect on the Water Authority's allocation needs to be passed through to the member agency developing the local supply.

For agencies adding planned local supplies during consecutive allocation years, a pass through of the net effect on the Water Authority's allocation from MWD will be conveyed directly to the Water Authority member agencies adding these local supplies. The specific change in the amount of water allocated to the Water Authority by MWD because of the member agency's local supply will be identified and the member agency's allocation will be adjusted accordingly by that amount of volume. If more than one agency is involved in a single local supply project, each participating agency's Water Authority allocation will be adjusted on a pro rata basis relative to the participating agency's share of the water delivered by the local supply project.

Under the MWD WSAP, "extraordinary" increases in production are treated differently than planned local supplies. This allows the member agency to improve its reliability through unplanned actions that are solely in response to the drought. Extraordinary increases, such as short-term water transfers and overproduction (mining) of groundwater basins, are not included in an agency's allocation year local supplies. However, the full amount of the extraordinary local supply will be included in the calculation of an agency's Retail Impact Adjustment. Similar to planned local supplies, the change in the amount of water allocated to the Water Authority by MWD will be identified and the allocation of the member agency who implemented the extraordinary local supply will be adjusted accordingly by that volume of water.

The MWD Board subsequently approved additional modifications to its WSAP in September 2011. To maintain continued equitable allocation of supplies to member agencies, an additional adjustment pertaining to recycled water development is now made to the Water Authority's allocation methodology based on the WSAP modifications. The net effect on the Water Authority's allocation from the increased recycled water developed after the based period would be passed on to those member agencies that developed the recycled water supplies. This would be reflected as a reduction in their allocation from the Water Authority. While the agency's allocation from the Water Authority would be reduced, the agency would still be better off in regard to reliability then if they had not developed the recycled water supply.

7.2.7 Carryover Storage Program

Permanent Special Agricultural Water Rate

Under the PSAWR Program, participants are exempt from paying the Water Authority's storage charge and in return will not receive supplies from the CSP during shortages and limited supplies from the ESP.

Carryover Storage Adjustment

Under the PSAWR Program, no CSP supplies are available to PSAWR participants during supply augmentation which begins in Level 1 of the WSCP. A description of the methodology used to ensure CSP supplies are delivered solely to M&I customers is outlined below.

Utilizing CSP Deliveries during Supply Augmentation (Level 1)

In this scenario, the assumptions are that MWD is allocating supplies to its member agencies, but the cutback is minimal, and the Water Authority and its member agencies are able to avoid mandatory cutbacks to M&I customers through shortage management actions. These actions could include voluntary conservation measures and utilization of CSP deliveries. To ensure no CSP supplies are delivered to PSAWR Program participants, each member agency with PSAWR Program participants would be given a PSAWR Program supply allocation based on the MWD cutback level. The following basic steps will be taken to establish the PSAWR Program allocation of non-CSP supplies:

1. Establish PSAWR Program base year, most recently completed fiscal years prior to activation of the WSCP; and
2. Apply M&I cutback level to each agency's PSAWR Program base year to determine its PSAWR Program allocation.

Allocating CSP Supplies during Mandatory Cutback Levels (Levels 2-6)

At this stage, MWD and the Water Authority are both allocating supplies to their member agencies. The Water Authority is utilizing CSP supplies to lessen the cutback level from MWD to M&I customers. In establishing member agency allocations, it is critical that the allocations reflect only CSP deliveries to M&I customers. As a result, a separate calculation to determine the M&I allocation of CSP deliveries is required. The methodology employed is consistent with the approach used to allocate non-CSP supplies (i.e., MWD allocation and Water Authority QSA supplies), except that WSAP Alignment Adjustments are not necessary because they pertain to allocation of MWD supplies.

For this sample calculation, it is assumed that the Water Authority is in mandatory cutbacks and 10,000 AF of CSP storage is made available for distribution to M&I customers. The methodology used to allocate the 10,000 AF of CSP supplies is shown in Table 7-9. In this scenario, each agency's percent share of M&I demand is used to determine its proportional share of the available CSP supplies.

Table 7-9
CSP Allocation (AF)

Agency	M&I Base Period Demand	Pro-rata Share of M&I Demand	CSP Allocation (10,000 AF available storage)
A	2,240	0.8%	80
B	6,503	2.4%	240
C	186,100	69.9%	6,990
D	45,780	17.2%	1,720
E	25,740	9.7%	970
Total	266,363	100.0%	10,000

7.2.8 Member Agency Final Total M&I Allocation

The last step in the allocation process is to calculate each agency's total available M&I Water Authority M&I supplies. This is done by summing each agency's allocation of M&I supplies and adding in its share of M&I CSP allocation, as shown in the following equation:

$$= \text{Supply Allocation} + \text{CSP Allocation (M\&I)}$$

For the example, Table 7-10 shows final M&I allocations for the sample agencies. Unless Water Authority supply cutbacks are severe, at or exceeding 20%, the calculation is now complete. If the cutback is severe, the methodology includes a regional reliability adjustment, which is discussed in Section 7.2.9 below.

Table 7-10
Final M&I Supply Allocation (AF)

Agency	SDCWA Initial M&I Allocation Volume	Loss of Local Supply Adjustment	MWD WSAP Alignment	CSP Allocation	Total M&I Allocation Volume
A	1,845	0	0	80	1,925
B	5,536	0	0	240	5,776
C	161,228	3,956	0	6,990	172,174
D	39,673	0	0	1,720	41,393
E	22,374	744	0	970	24,088
Total	230,656	4,700	0	10,000	245,356

7.2.9 Regional Reliability Adjustment (if required)

In accordance with Principle 15, which states, *"In order to protect the economic health of the entire region, it is very important for the allocation methodology to avoid large, uneven retail impacts across the region. The methodology should include a minimum level of retail agency reliability to ensure equitable allocation among the member agencies,"* a regional reliability floor was established. The floor, if needed, is set at 5% below the region's total level of service and is triggered when the net cutback to total Water Authority supplies reaches or exceeds

20%. Taking into account the supply development by the Water Authority, its member agencies, and MWD, this level of cutback is very unlikely. The first step in determining the adjustment is calculation of the level of service for each member agency and region, which is shown below.

Level of Service

The level of service value is computed as the ratio of total supplies available to an agency, including allocated imported supplies and local resources, to projected demand during that same period. Thus, in order to calculate Level of Service estimates, projected member agency allocation-year demand and supply projections are necessary.

Table 7-11 contains estimated allocation-year demands and supplies used for this example. The second column titled, “M&I Demand on SDCWA”, has been computed for this example by adding the demand increase associated with the growth adjustment and the estimated loss of local potable supply volume to the base period M&I demand. Estimated allocation year local supplies used to offset imported demands are provided by member agencies.

Table 7-11
Allocation-Year M&I Demand and Supply (AF)

Agency	M&I Demand on SDCWA	Total Local Supply	Total Demands
A	2,220	70	2,290
B	6,920	0	6,920
C	192,600	20,446	213,046
D	45,380	1,400	46,780
E	26,540	4,125	30,665
Total	273,660	26,041	299,701

Summing an agency's M&I allocation volume (Table 7-10) and projected allocation-year total local supplies (Table 7-11) results in their total supply during a cutback. This value is then divided by the projected total demand (Table 7-11) to generate the agency's estimated level of service. A summary of agency level allocations and resulting levels of service is shown in Table 7-12. The M&I level of service of the agencies' and region are utilized in severe cutback levels to calculate the regional reliability adjustment.

Table 7-12
M&I Allocation and Resulting Level of Service (AF)
 15% Cutback to MWD Supply

Agency	Total Allocation Volume	Total Local Supply	Total Supply	Projected Total Demand	Level of Service
A	1,925	70	1,995	2,290	87%
B	5,776	0	5,776	6,920	83%
C	172,174	20,446	192,620	213,046	90%
D	41,393	1,400	42,793	46,780	91%
E	24,088	4,125	28,213	30,665	92%
Total	245,356	26,041	271,397	299,701	

Total Regional Level of Service - (271,397/299,701) = 91%

Regional Reliability Adjustment Calculation

The regional reliability floor effectively reallocates a portion of the Water Authority's supplies necessary to bring all agencies up to the minimum level of service. This floor is set at 5% below the region's total level of service and is triggered when the net cutback to total Water Authority supplies reaches or exceeds 20%. The volume of imported supplies required to meet this shortfall is provided by those agencies with a total level of service exceeding the region's total level of service. An agency's contribution is calculated by multiplying its pro-rata percent share of the aggregated exceedance volumes by the total level of service shortfall. However, an agency's contribution cannot exceed quantities that would lower its total level of service below the regional level of service.

Data from the previous example is used to illustrate the regional reliability floor adjustment procedure. In this scenario, the reduction in MWD's supply is elevated to 30%. As a result, the net cutback in Water Authority total supplies increases to 28%, which triggers the reliability adjustment. A detailed summary of the regional reliability floor calculation is shown in Table 7-13.

7.2.10 Data Reconciliation

Since allocations are based on estimated values, an assessment of each agency's actual demand and supply utilization during a cutback is necessary. Through this process, a final accounting of appropriate allocation volumes will be calculated. The reconciliation of certified and actual data will occur at the end of the allocation period or at the end of twelve months, whichever comes first. Agencies are required to certify the following information: total and PSAWR demands, base period GPCD, local potable use and recycled water use.

7.2.11 Future Updates to Allocation Methodology

It is anticipated that minor adjustments to the allocation methodology will be needed in response to long-term water conservation framework legislation that supersedes SB X7-7. These modifications will include, but may not be limited to, minor adjustments to the calculation methodology for the growth and GPCD compliance adjustments.

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Table 7-13
Regional Reliability Floor (AF)
 30% Cutback to MWD Supply

Available Supply: 192,652

Regional Reliability

Regional Level of Service (233,393/299,701) =

78%

Regional Reliability Floor (-5%)

73%

Level of Service

Agency	SDCWA Initial Allocation Volume	Estimated Local Supplies	Loss of Local Supply Adjustment	CSP Allocation	Total Supply	Projected Total Demand	Level of Service
A	1,541	0	0	80	1,691	2,290	73.9%
B	4,624	0	0	240	4,864	6,920	70.3%
C	134,664	15,346	3,956	6,990	166,056	213,046	77.9%
D	33,136	0	0	1,720	36,256	46,780	77.5%
E	18,687	1,925	744	970	24,526	30,665	80.0%
Total	192,652	17,271	4,700	10,000	233,393	299,701	

Regional Reliability Floor Reallocation

Agency	Total M&I Floor Check	Total M&I Shortfall	Pro-rata Share of Total Shortfall	Exceedance of Regional Reliability Average	Exceedance Volume	Pro-rata Share of Exceedance	Exceedance Agency Contribution	Revised SDCWA Initial Allocation	Revised Total Supply	Revised Level of Service
A	0.0%	0	0.00%	0.00%	0	0.0%	0	1,541	1,691	73.9%
B	-2.7%	188	100.00%	0.00%	0	0.0%	0	4,812	5,052	73.0%
C	0.0%	0	0.00%	0.00%	0	0.0%	0	134,664	166,056	77.9%
D	0.0%	0	0.00%	0.00%	0	0.0%	0	33,136	36,256	77.5%
E	0.0%	0	0.00%	2.00%	607	100.0%	188	18,499	24,338	79.4%

Shortfall Calculation

Exceedance Calculation

Reallocation

7.3 Member Agency Transfers Secured Following Allocation Methodology

The Water Authority's member agencies have the option of purchasing water from an entity and using, among other facilities, the SWP, the Colorado River Aqueduct (CRA), MWD's distribution system, and the Water Authority's distribution system to wheel the water. In addition to the cost of the transfer water, the member agency would pay the applicable wheeling rates to utilize these facilities. This transfer water would not be considered a Water Authority supply or local supply when allocating Water Authority supplies under the methodology included in the WSCP. Rather, the transfer water would be "on top" of the allocation, and thus, not factored into the allocation methodology base period or be eligible for the local project development adjustment.

However, under the MWD WSAP, these transfer supplies would be considered an "extraordinary" increase in production as discussed in Section 7.2.6. With extraordinary increases, only the portion of the production equal to MWD's regional shortage is added to the base period local supply. The remainder of the supply is outside of the MWD WSAP and adds directly to the agency's supply. For example, during a 10% shortage, 10% of the extraordinary increase is added to the base period local supplies while 90% is not. It is through this addition to the base period local supplies that the Metropolitan allocation to the Water Authority is reduced.

Consistent with the Water Authority's alignment methodology, the net effect on the Water Authority's allocation from MWD will be directly passed through to member agencies with the extraordinary increases in production. The change in the amount of water allocated to the Water Authority by MWD will be identified and the member agency's allocation will be adjusted accordingly by that amount of water. If more than one agency is involved, each participating agency's Water Authority allocation will be adjusted on a pro-rata basis relative to the participating agency's share of the extraordinary local supply increase.

Water Authority staff will assist member agencies in entering into agreements with the wheeling entities. Additionally, the Water Authority may need to be a signatory to some of the wheeling agreements, such as an agreement with MWD. However, it will be the member agency's responsibility to find the transfer water, enter into an agreement with the selling entity, and comply with any other requirements (e.g. California Environmental Quality Act, National Environmental Policy Act). Any transfer water identified by the Water Authority during its search that it chooses not to purchase will also be available for purchase by its member agencies. The Water Authority will notify the member agency managers should transfers be available for purchase.

Section 8

Catastrophic Water Shortage

A catastrophic water shortage occurs when a disaster, such as an earthquake, results in insufficient available water to meet the region's needs or eliminates access to imported water supplies. This section describes the Water Authority's ICP, ESP, and Emergency Water Delivery Plans (EWDPs), all of which were developed to protect public health and safety and to prevent or limit economic damage that could occur from a severe shortage of water supplies. Additional information on these plans can be found on the Water Authority's website at www.sdcwa.org.

8.1 Integrated Contingency Plan

The ICP provides staff with the information necessary to respond to an emergency that causes severe damage to the Water Authority's water distribution system or impedes the Water Authority's ability to provide reliable water service to its member agencies. The ICP describes the situations and incidents that trigger the activation of the ICP and Emergency Operations Center (EOC). It also provides direction and strategies for responding to a crisis. The ICP includes:

- Authorities, policies, and procedures associated with emergency response activities.
- EOC activities, including activation and deactivation guidelines.
- Multi-agency and multi-jurisdictional coordination, particularly between the Water Authority, its member agencies, and MWD in accordance with Standardized Emergency Management System and National Incident Management System guidelines.
- Incident Command System management and organization and emergency staffing required to assist in mitigating any significant emergency or disaster.
- Mutual Aid Agreements and covenants that outline the terms and conditions under which mutual aid assistance will be provided.
- Hazard specific action plans and Incident Command System position checklists.

In addition, the ICP uses a step-by-step approach to emergency response planning by providing tools such as resource and information lists, personnel rosters, pertinent policies and procedures, and reference materials. The Water Authority provides input to the Unified San Diego County Emergency Services Organization's "Operational Area Emergency Plan," which, in turn, supports the ICP.

8.2 Emergency Storage Project

The ESP is a system of reservoirs, pipelines, pump stations, and other conveyance facilities

intended to improve San Diego's regional water storage capacity and allow stored emergency water to be delivered to the Water Authority's member agencies within San Diego County during a prolonged regional interruption. The ESP facilities can be used to help deliver emergency water supply to member agencies during two- and six-month emergency events in which the region is either completely unable or partially able to receive imported water deliveries due to a disaster that renders their transmission system inoperable.

A regional emergency event is a catastrophic interruption of imported water supplies, or any other emergency situation in which the Water Authority has insufficient water available to supply at least 75% of the total demand of its service area, or any portion thereof. The Water Authority Board may also authorize that water stored for emergency use under the ESP be used in a prolonged drought or other water shortage situation.

The regional emergency water supply reservoirs (with their ESP capacity) are Olivenhain (18,000 AF), Lake Hodges (20,000 AF), and San Vicente (52,100 AF). The actual amount of ESP water to be delivered to a particular member agency during an emergency event will depend on many factors, including member agency demands, local supplies, parts of the ESP infrastructure and other Water Authority infrastructure in place, availability of supplies from MWD, and the actual duration of the emergency. Overall, the ESP was designed to create a regional storage capacity of 90,100 AF of water to meet emergency needs. Recent trends in regional water demand indicate that this volume of emergency storage will serve the region beyond 2045.

Completion of the Water Authority's Twin Oaks Valley Water Treatment Plant (WTP) in 2008 increased the ability to treat emergency water supplies delivered from Olivenhain and Lake Hodges Reservoirs. Prior to construction of the Twin Oaks Valley WTP, many member agencies that normally receive treated water from the Water Authority would have to be delivered untreated water in a two-month emergency event. The untreated water would have to be conveyed in treated water pipelines, resulting in the need for decontamination of the treated water pipelines prior to switching back to treated water deliveries. Additionally, the completion of the Lewis Carlsbad Desalination Plant allows the Water Authority to deliver treated water supply to member agencies during emergency events. This results in a commensurate decrease in emergency storage that needs to be maintained in ESP reservoirs.

8.3 Emergency Water Delivery Plans

EWDPs provide forecasts of Water Authority emergency water supply deliveries to its member agencies during two- and six-month emergency events, the same planning level events that formed the basis for the design of ESP facilities. These forecasts are referred to as EWDPs. Water supplies included in EWDP development are imported water supplies (for 6-month event only) and local supplies. Imported water supplies include Water Authority QSA transfers, spot transfers, out-of-region storage supplies, and MWD supplies. Local supplies include member agency local supplies and Water Authority in-region supplies. Member agency local supplies consist of recycled water, seawater desalination, groundwater, and water stored in surface reservoirs. The transfer of local supplies between member agencies is also considered. Water Authority in-region supplies consist of water produced at the Lewis

Carlsbad Desalination Plant and water stored in ESP surface reservoirs.

The following general procedure from the EWDPs shows the methodology to calculate the allocation of ESP supplies to member agencies in a prolonged outage situation without imported supplies:

- Define the water storage and conveyance facility infrastructure that would be in place at the time of the emergency event in order to estimate duration of emergency (that is, time needed to repair damaged pipelines and/or infrastructure);
- Determine the total demand of each member agency during the emergency, considering both M&I and agricultural demands;
- Determine the net demand of each member agency, considering the availability of recycled water supplies;
- Determine the local supplies available to each member agency, including: potable reuse, groundwater, surface water storage, and seawater desalination;
- Determine the amount of local water that could be transferred within City of San Diego service areas;
- Determine the amount of transfers between member agencies based on existing agreements;
- Determine the amount of Lewis Carlsbad Desalination Plant supplies that could be delivered to member agencies;
- Determine the amount of imported water supplies available to deliver to member agencies;
- Allocate ESP supplies in Olivenhain, Lake Hodges, and San Vicente Reservoirs to each member agency to achieve an initial level of service of 75%, considering other supplies available to each member agency as described above and taking into account limitations of delivery facilities;
- Determine reductions in deliveries to member agencies participating in the Water Authority's TSAWR program. The cutback rate for TSAWR customers is twice the rate imposed on Water Authority M&I customers, up to a 90% cutback. Reductions in deliveries that arise from such a cutback will be reallocated to commercial and industrial customers;
- Determine increases in member agency deliveries due to redistribution of the emergency water not delivered to member agencies as a result of the TSAWR program; and

- Determine net Water Authority deliveries to member agencies from all water supply sources available to the Water Authority, consisting of Lewis Carlsbad Desalination Plant supplies, imported water supplies, and ESP reservoir supplies.

8.4 Multi-Hazard Mitigation Plan

Water Code Section 10632.5 requires an urban water supplier to include within its UWMP a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. An urban water supplier may comply with this requirement by submitting a copy of the most recently adopted multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the multihazard mitigation plan addresses seismic risk.

Appendix E includes a copy of the *Multi-Hazard Mitigation Plan for San Diego County, California* (MHM Plan). The MHM Plan was prepared with input from the Water Authority and under the federal Disaster Mitigation Act of 2000. Section 4.3.4 of the MHM Plan addresses seismic risk.

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Section 9

Communication Plan

9.1 Introduction

The Water Authority and its 24 member agencies conduct communications and outreach about water supplies and water-use efficiency as an ongoing activity during normal supply conditions. However, clear and effective communications between water agencies, the public, public officials and other key stakeholders becomes even more important if supply conditions become abnormal and the Water Authority needs to activate its WSCP. Experience from previous droughts or other demand management periods, along with data from regional public opinion polls, indicate that when there is a need for urgent water conservation, people basically want to know the following:

1. What they need to do – specifically – to save water
2. How much water they need to save and for how long
3. Why they need to save water
4. What water agencies are doing to correct the supply problem or address the situation

While communicating these points may seem simple and straightforward on the surface, in practice the process can be challenging and complex for the Water Authority. The very diverse needs and characteristics of the Water Authority's member agencies alone puts limits on the scope of messages and tactics that can be applied to the entire region. To further complicate matters, state-imposed regulations on local water districts during droughts or supply shortages have the potential to dictate a wide range of water-saving targets – and thus a variety of needed behaviors – across the region. Experience also has shown it is possible for the state to mandate emergency water savings targets or measures when there is no actual shortage emergency in the region. Finally, if residents and businesses are asked to save water for an extended period of time, their resolve to comply and help water agencies achieve their respective water-use targets can be eroded by a number of factors ranging from impacts to water rates, negative effects to their lifestyle, equity issues or simple “drought fatigue.”

These possibilities make it even more difficult for the Water Authority and its member agencies to communicate effectively, avoid confusion and maintain credibility. However, in previous droughts the Water Authority and its member agencies have been able to work together to overcome these obstacles and conduct effective, award-winning outreach campaigns. This section of the WSCP describes the basic communications plan needed to help the Water Authority successfully convey crucial information during all stages of the WSCP.

9.2 Coordination

For the reasons described in Section 9.1, it is vital for the Water Authority's communications

to be closely coordinated with its member agencies. The Water Authority regularly interacts with its member agencies at several levels to ensure regional messaging and outreach efforts remain appropriate, effective and responsive to member agency needs. These levels include the Joint Public Information Council/Conservation Coordinators (staff level), the Member Agency Managers group (management level) and the Water Authority Board's Legislation and Public Outreach Committee (Board level). During droughts or other times of limited supply that activate the WSCP, the Water Authority will establish more frequent schedules of updates, reports or discussions at all levels to ensure Water Authority outreach messages and tactics stay in sync with the changing needs of member agencies and their customers. The schedule and timing of these updates may adjust periodically to reflect evolving water shortage conditions or other factors.

During droughts or other situations that create supply shortages, it's also common for entities outside the San Diego region, such as MWD, the Association of California Water Agencies and DWR, to engage in communication activities that extend into this area. Water Authority outreach staff will also engage in regular contact with these entities to help minimize the potential for their activities to cause local confusion, as well as seek opportunities to leverage these external resources to complement outreach already under way by the Water Authority and its member agencies.

To maximize internal coordination, the Water Authority will convene a "cabinet" of senior management and department executives from across the organization to discuss supply planning, operational, financial and communication issues related to the WSCP as needed.

9.3 Flexibility and Adaptability

The Water Authority's WSCP includes six distinct levels of potential shortage, along with "normal" conditions when no out-of-the-ordinary water-saving actions are called for. It also includes a "catastrophic" condition when extreme events prompt emergency-oriented water-saving measures to preserve supplies for health and safety. It's possible for the desired scope of water-saving actions or outcomes to vary widely at each level of the plan. For example, at Level 2 the communication messages, tactics and resources needed to reach a target of 12% would likely be very different than those needed to hit a target of 20%.

In addition, there are many potential communication strategies and tactics that can be deployed to help the Water Authority successfully implement each level of the WSCP. The precise mix of appropriate strategies and tactics is best determined based on a number of factors, including what WSCP level is activated, the specific supply or regulatory circumstances driving that activation, budget availability, seasonal conditions, and other factors.

Because of these potential variations, this communication plan doesn't dictate every strategy and tactic or the scale of resources that needs to be applied regionally at each level of the WSCP. Rather, this plan includes recommended strategies and tactics that generally match the needs associated with the escalating levels. This is intended to give the Water Authority's Board and management the flexibility to apply tailored communications approaches that best

fit the specific goals of the Water Authority and its member agencies at any given point, and the agility to react quickly to any changes in conditions. An outline summarizing recommended actions at each level is at the end of this section of the communication plan in Table 9-1. Specific, customized campaign plans with budgets and timelines will be crafted by the Public Affairs Department when needed to reflect the unique circumstances of any demand management or water shortage situation.

9.4 Key Audiences

The Water Authority needs to communicate with many different stakeholders as part of the WSCP. The intensity of outreach will likely vary with the WSCP level that is active at any given time, but the key audiences for the communication plan are fairly consistent. In general, they include:

- Member agencies
- General public (water consumers)
- Public officials
- Homeowners
- Multi-family property owners/managers
- Commercial-industrial property managers
- Landscape contractors/suppliers
- Business/civic leaders
- High-visibility or high-water-use industries (restaurants, hotels, construction, etc.)
- Land-use agencies
- Environmental groups
- Community-based service organizations
- Non-English-speaking populations
- Temporary residents (tourists, college students, etc.)

While it's important to communicate with all of these groups, at times some of these audiences may require higher priority or specialized outreach. Public Affairs staff will coordinate closely with member agencies and solicit feedback from stakeholders as needed to ensure outreach efforts are reaching key audiences.

9.5 Communication Objectives

In general, the communication objectives during the various levels of the WSCP include the following:

- Motivate water users to increase conservation immediately in ways that are consistent with any voluntary or mandatory actions called for at the current level of the WSCP.
- Raise awareness and understanding of the drought, regulatory or other conditions affecting water supplies and the need for increased conservation.

- Minimize confusion and maintain credibility of water agencies and conservation messages with an appropriate tone that avoids “cry wolf” perception and non-compliance backlash.
- Make water users feel appreciated for existing accomplishments in improving their water-use efficiency, and for supporting regional and local investments in water supply reliability.
- Educate regional civic and business leaders, elected officials and the public that the region’s water agencies have greatly improved the region’s water supply reliability by promoting water-use efficiency programs, diversifying water supply sources and investing more than \$3.5 billion in alternative supplies and major water infrastructure.
- Prepare the region for escalation (or de-escalation) of the WSCP based on trending supply conditions.
- Ensure all stakeholders believe they are being treated fairly in relationship to other stakeholders.
- Maintain communication effectiveness by soliciting or monitoring feedback from member agencies, key stakeholders and the general public to update or adapt messages or tactics.
- Exit WSCP implementation having demonstrated the effectiveness and value of conservation actions and water supply reliability investments in minimizing impacts to the region’s economy and quality of life.

9.6 Standard Communications

During normal water supply conditions, the Water Authority will engage in standard communications and outreach activities. That means the Water Authority will promote water-use efficiency as a way of life in the San Diego region as part of its regular messaging delivered through the following channels:

- Media relations (pitches, interviews and news releases)
- Social media (Twitter, Facebook, YouTube, etc.)
- Websites (sdcwa.org and WaterSmartSD.org)
- E-newsletters
- Speaker’s Bureau presentations
- Community events
- Citizens Water Academy
- Water News Network

During normal conditions, water efficiency will be promoted by sharing water-saving tips that are consistent with any permanent water-use restrictions in effect throughout the San Diego region (by statewide mandate or consensus of all member agencies). It will also be promoted by ongoing marketing of the Water Authority’s array of regional water-use efficiency programs that are designed to help the member agencies achieve their long-term water management targets or goals, as well as promotion of other available water-savings tools and resources (for example, any available MWD-administered programs or SDG&E-funded

programs).

9.7 Level 1 Strategies and Tactics

This section lists a number of strategies the Water Authority has used to guide successful drought response campaigns in the past and should be considered during Level 1 of the WSCP (up to 10% voluntary conservation).

Recommended Strategies

- Engage member agencies in the development of a regional campaign theme that fits the call for increased conservation and can adapt to changing levels of the WSCP as necessary.
- Send clear, consistent and understandable messages encouraging increased voluntary conservation.
- Develop and maintain a steady stream of media relations activities and social media communications that explain the need to conserve and how to conserve, promote water-use efficiency programs and incentives, and/or give general support for water conservation. Schedule these efforts to provide timely support for water-use efficiency events, strategies and other programs.
- Enhance the level of conservation-oriented community outreach through greater frequency of outreach at community events and speaker's bureau presentations.
- Develop specific outreach efforts that target key industries or groups (hospitality, HOAs, building managers, etc.) to raise awareness of, and participation in, drought response actions and water-use efficiency programs.
- Recruit community and media partners who can expand the reach of drought response communications.
- Establish an online hub for:
 - Information on current status of regional WSCP and recommended water conservation practices
 - Link to www.WaterSmartSD.org, sdcwa.org or other appropriate website for more water conservation tips, rebates, tools and other resources
 - Updated information on statewide weather, water supply and/or regulatory conditions
 - Information on how the Water Authority and its 24 member agencies are successfully enhancing the region's water supply reliability through investments in water supply diversification and major infrastructure
 - Links to member agency websites for retail level information
- Regularly communicate with local, state and other elected officials in the region about the importance of achieving voluntary water conservation and encourage them to publicly promote such efforts to their constituents.

Recommended Tactics

- Member agency communications
 - Involve member agencies in development and implementation of communication plan through more frequent JPIC meetings and supplemental communications.
 - Provide regular campaign updates to member agency general managers and their designated staff, and Board members.
 - Provide campaign outreach materials (newsletter articles, graphics, bill stuffers, etc.) to member agencies for reproduction and distribution.
 - Encourage member agencies to promote consistent regional messaging and conservation programs to their customers and the public in their service areas.
- News conference or other event to announce/explain change in WSCP level
- Water Authority communications (ongoing)
 - Media relations
 - News releases, advisories, op-eds, etc.
 - Media opportunities (pitches, events, in-studio appearances, etc.)
 - Partnerships
 - Website messaging (sdcwa.org and/or WaterSmartSD.org)
 - Provide links to local agency webpages containing water-use restrictions or other drought instructions/resources for customers
 - Provide searchable directory of conservation rebates or programs by postal code or street address
 - Provide lists of easy, understandable water-saving tips
 - Provide links to water-savings programs
 - E-newsletters
 - Social media (Twitter, Facebook, YouTube, etc.)
- Community relations
 - Events (water-efficient plant fairs, classes, fairs, garden tours, etc.)
 - Speakers Bureau presentations
 - Community partnerships
 - Restaurants
 - Hotels/motels
 - Local breweries
 - San Diego Gas & Electric
 - Large employers (public and private)
 - Public agencies (Caltrans, San Diego County, etc.)
 - Shopping malls (Westfield, Simon Property Group)
 - High-traffic destinations (airport, theme parks, San Diego County Fair, etc.)
 - Regional gardens (Water Conservation Garden, San Diego Botanic Garden)
 - Ethnic outreach (presentations, community events, partnerships)

- Industry relations
 - Targeted outreach to high-water-use industries
- School education
 - Modify school assembly program content to include messages about need for increased voluntary conservation.
 - Provide other regional water and environmental education programs with key messages about need for increased conservation.
- Government relations outreach
 - Encourage elected officials to post links to regional campaign on their websites and promote water conservation tips and program availability at www.WaterSmartSD.org to constituents through newsletters and social media.
 - Provide conservation information and other support as necessary to government officials for their own media events, hearings, community meetings, etc.
- Advertising
 - Execute targeted advertising plans to enhance awareness of need for increased voluntary conservation or spur participation in specific programs or behaviors.
 - Coordinate campaign timing/placement with those of other water agencies to leverage available resources (City of San Diego, MWD, Department of Water Resources/Association of California Water Agencies).
 - Coordinate message tone and content to maximize consistency and minimize confusion; ensure external campaign messages are appropriate for San Diego region.
 - Complement ads with public service announcements on local government access channels
- Educational/promotional items that encourage conservation (dye tablets, self-closing hose nozzles, etc.)
- Testing and evaluation
 - Use public opinion polls and other opportunities to test messages and tactics and revise as needed to increase effectiveness.

9.8 Level 2 Strategies and Tactics

In the event of a more severe supply shortage or demand management period that requires entering Level 2 of the WSCP (up to 20% mandatory conservation), the Water Authority will continue to deploy or enhance Level 1 strategies and tactics as needed, and will consider supplemental strategies and tactics listed below.

Recommended Strategies

- Engage member agencies in the development of a more serious campaign message that reflects the need for compliance with mandatory water-use restrictions. Provide visuals and other supporting materials for the campaign to member agencies.
- Send clear, consistent and understandable messages regarding mandatory water-use restrictions in effect.
- Enhance media relations activities and social media communications related to water-use restrictions, conservation programs and drought conditions. Schedule these efforts to provide timely support for new campaign initiatives, conservation events and other programs.
- Leverage stakeholder groups' communication channels to help distribute updated information about restrictions and conservation as soon as possible; groups to include business organizations, civic organizations, service clubs, religious leaders, elected officials, along with key associations governing HOAs, building managers, landscape companies, etc.
- Expand efforts to recruit community and media partners who can expand the reach of drought response communications.
- Enhance the campaign's current level of grass-roots community outreach with strategies and tactics that encourage more community members to publicly show their support for the campaign (i.e., turn more homeowners, property managers, students, etc. into individual "community partners" promoting increased conservation in neighborhoods around the county)
- Expand drought outreach advertising; continue to coordinate communications and advertising messages and plans with the region's 24 member agencies, MWD, the state Department of Water Resources, and other agencies.
- Consider adjustments to water conservation resources and programs in ways that make finding and participating in key programs easier, or to facilitate short-term water savings. Support these efforts with events to provide information and resources to consumers or other stakeholders.

Recommended Tactics

- Member agency communications
 - Involve member agencies in planning and implementing more serious or urgent campaign messaging and activities.
 - Supplement regular JPIC meetings with more frequent communications (email updates, etc.) as needed.
- News conference or other event to announce/explain any change in WSCP level
 - Consider joint announcement with business/civic partners to enhance communitywide buy-in for water-savings actions.
- Water Authority communications (ongoing)
 - Websites
 - Add "pop-ups" with outreach campaign messages to sdewa.org and WaterSmartSD.org.
 - E-newsletter

- Ensure drought updates or conservation information are distributed at least twice monthly through WaterSource e-newsletter.
- Social media
 - Expand community engagement on drought campaign through more involved social media activity (consider neighborhood-based outreach via Nextdoor or other means).
- Regional water-waste reporting app
 - Enhance efforts to encourage customers to download and use it to report incidents of water waste directly to member agencies.
- Stakeholder outreach
 - Provide updated campaign messaging to business groups, service clubs, religious leaders, elected officials to distribute to their own audiences (via newsletter, email, etc.).
 - Accelerate outreach efforts to key associations governing HOAs, building managers, landscape companies, etc. to immediately raise awareness of and compliance with mandatory water use restrictions, as well as to update information on available conservation resources.
- Community Partnerships
 - Consider adding budget resources to attract more high-value community partnerships
- Government Relations
 - Supplement existing activities with in-person briefings to state and local officials on state of water supplies and water conservation campaign.
- Advertising
 - Execute mass-market regional advertising with involving radio, TV to enhance awareness of needed mandatory water-saving actions.
 - Continue to coordinate campaign timing/placement with those of other water agencies to leverage available resources (City of San Diego, MWD, Department of Water Resources/Association of California Water Agencies).
- Testing and evaluation
 - Use public opinion polls or other opportunities to test messages and tactics and revise them as needed to increase effectiveness.

9.9 Level 3-4 Strategies and Tactics

In the event of a more severe supply shortage or demand management period that requires entering Level 3 or 4 of the WSCP (up to 30% or 40% mandatory conservation, respectively), the Water Authority will continue to deploy or enhance Level 2 strategies and tactics as needed, and will consider supplemental strategies and tactics listed below.

Recommended Strategies

- Engage member agencies in the development of a more serious campaign message that reflects the need for higher level of extraordinary conservation. Provide visuals and other supporting materials for the campaign to member agencies.
- Send clear, consistent and understandable messages regarding mandatory water use restrictions in effect and escalating challenges affecting water supplies.
- Conduct specialized outreach to landscape industry and water users with large ornamental landscapes to achieve significant reductions in discretionary outdoor water use while minimizing long-term property damage.
- Initiate targeted outreach to major CII water users to help them identify, prepare for and, as much as possible, avoid negative impacts from extreme water conservation requirements.
- Evaluate the appropriateness of continuing to promote long-term water-use efficiency programs and tools amid worsening supply conditions/increasing restrictions.

Recommended Tactics

- Member agency communications
 - Involve member agencies in the planning and implementation of updated messages and campaign activities to raise awareness for more extreme water-saving actions and behaviors; provide updated communications materials to member agencies.
- News conference or other event to announce/explain any change in WSCP level
 - Invite local elected officials to participate to convey need for savings across the region.
- Water Authority communications (ongoing)
 - Promote compliance with specific, regionally applicable water-use restrictions.
 - Encourage users to check with local water agencies for additional rules or restrictions in effect for their area.
 - Provide instructions for triaging landscape resources during extreme shortage conditions (saving trees, etc.).
- Stakeholder outreach
 - Reinforce business groups, service clubs, religious leaders, elected officials to spread awareness of need for significant, collective water-saving actions to preserve our economy and quality of life.
 - Provide specialized technical assistance sessions or resources to help homeowners achieve immediate reductions in water use while minimizing landscape damage.
 - Consider providing specialized technical assistance to large landscape customers (HOAs, cities, schools, etc.) to help achieve large-scale reductions in discretionary outdoor water use.
 - Conduct specialized outreach to industries (hospitality, car washes, restaurants, etc.) or other large-scale water users (schools, park and rec

- districts) that will likely experience impacts from emergency conservation to determine solutions for minimizing economic or quality of life impacts.
- Add water conservation information/assistance resources to 211 emergency services directory.
- Advertising
 - Supplement mass-media campaign to enhance awareness of extreme water-saving actions as needed.
- Testing and evaluation
 - Use public opinion polls or other opportunities to test messages and tactics, and revise as needed to increase effectiveness.

9.10 Level 5-6 Strategies and Tactics

In the event of a situation that requires entering Level 5 or 6 of the WSCP (up to or greater than 50% mandatory conservation, respectively), the Water Authority will continue to deploy or enhance Level 3-4 strategies and tactics as needed, and will consider supplemental strategies and tactics listed below to reflect increased shortage conditions.

Recommended Strategies

- Engage member agencies in the development of campaign messages and tactics that raise awareness of the extreme shortage conditions facing the region and the likely need to focus water use on essential public health and safety needs.
- Send clear, consistent and understandable messages regarding what uses of water or levels of water use remain acceptable for residential, commercial and public water users.
- Emphasize the need for all residents and businesses to work together to help the region successfully weather the situation.
- Raise awareness of any urgent actions being taken by water agencies to improve water supply conditions; provide regular updates on those efforts.
- Suspend promotion of ongoing water-use efficiency programs to focus resources on promoting extreme/emergency conservation measures.
- Coordinate with regional emergency response agencies/services on messaging/additional outreach tactics if needed.

Recommended Tactics

- Member agency communications
 - Involve member agencies in the planning and implementation of updated messages and campaign activities to raise awareness for water-saving actions and behaviors; provide updated communications materials to member agencies.
- News conference or other event to announce/explain any change in WSCP level; consider joint event with emergency response/public health authorities

- Water Authority communications
 - Encourage users to check with local water agencies for additional rules or restrictions in effect for their area.
 - Promote all available resources to aid vulnerable populations.
 - Provide updates to media and other stakeholders on water supply conditions as often as possible (daily or as needed).
 - Evaluate need for “phone bank” or additional staff resources to handle public inquiries.
- Stakeholder outreach
 - Provide updated communications materials to business groups, service clubs, religious leaders, elected officials to raise immediate awareness for increased water-savings actions and available assistance resources.

9.11 Catastrophic Shortage Communications

In the event of a natural disaster, infrastructure failure or other situation that requires regional water use to be quickly prioritized for or limited to essential public health and safety needs, the Water Authority will immediately deploy or enhance appropriate communication strategies and tactics from WSCP Levels 1-6 as needed, and will consider strategies and tactics listed below to reflect the need for urgent, emergency-driven water conservation.

Recommended Strategies

- Engage member agencies in the development of campaign messages and tactics that raise awareness of the emergency conditions facing the region and the need to focus water use on essential public health and safety needs.
- Send clear, consistent and understandable messages regarding what uses of water or levels of water use remain acceptable for residential, commercial and public water users, and the expected duration of this restricted level of water use
- Emphasize the need for all residents and businesses to work together to help the region successfully weather the situation.
- Raise awareness of any urgent actions being taken by water agencies to improve water supply conditions; provide regular updates on those efforts.
- Suspend promotion of ongoing, long-term water-use efficiency programs and tools to focus resources on communicating need for immediate water conservation actions.
- Coordinate with local emergency response agencies/services on messaging and outreach tactics where possible.

Recommended Tactics

- Member agency communications
 - Involve member agencies in the planning and implementation of updated messages and campaign activities to raise awareness for emergency-level

water-saving actions and behaviors; provide updated communications materials to member agencies.

- News conference or other event to announce/explain change in WSCP level
 - Consider joint announcement with emergency response or public health agencies to reflect need for emergency-level water conservation.
- Water Authority communications
 - Provide specific instructions for acceptable water use during emergency conditions and how long conditions will likely be in effect.
 - Encourage users to check with local water agencies for additional rules or restrictions in effect for their area.
 - Promote all available resources to aid vulnerable populations.
 - Provide updates to media and other stakeholders on water supply conditions as often as possible (daily or as needed).
 - Consider deploying alternate home page on sdewa.org to emphasize emergency-oriented water conservation actions.
- Stakeholder outreach
 - Provide updated communications materials to business groups, service clubs, religious leaders, elected officials to raise immediate awareness for emergency-level water-savings actions and available assistance resources.
 - Conduct specialized outreach to landscape and related industries with significant outdoor water use to urge immediate end to landscape water use (if required).
 - Coordinate dissemination of information regarding water-use restrictions to local law enforcement or other public agencies to help maximize widespread compliance with emergency mandates.

Table 9-1
General Communication Plan Outline

Normal Conditions	Level 1 Up to 10% Voluntary Conservation	Level 2 Up to 20% Mandatory Conservation	Levels 3-4 Up to 30% or 40% Mandatory Conservation	Levels 5-6 Up to 50% or >50% Mandatory Conservation
Standard outreach efforts in effect (media relations, social media, websites, speakers' bureau, etc.)	Update message platform to reflect conditions, Water Authority response, and needed actions from public	Update campaign and messages to generate immediate actions/behaviors by public	Update campaign and messages to raise awareness for more severe water-saving actions/behaviors by public	Update campaign and messages to reflect extreme or emergency condition and likely need to focus water use on health/safety needs
Promote ongoing WUE programs/tools/ partnerships designed to achieve long-term water management goals (SB X7-7 or other)	Announce status change to key stakeholders, general public (News release, social media, etc.)	Announce status change to key stakeholders, general public (News release, social media, etc.)	Announce status change to key stakeholders, general public (News release, social media, etc.)	Announce status change to key stakeholders, general public (News release, social media, etc.)
Standard coordination with member agencies (JPIC meets 6x a year)	Include increased conservation messages on sdcwa.org and in standard outreach efforts; provide regular condition updates to stakeholders/media	Supplement Level 1 activities with additional tactics (mass media ads, partnerships, events, Nextdoor messages, etc.) as needed; provide regular condition updates to stakeholders/media	Supplement Level 2 outreach with additional tactics (supplemental ads, etc.) as needed; provide regular updates to stakeholders/media on conditions	Supplement Level 3-4 outreach with additional tactics (phone bank/hotline, etc.) as needed; provide regular condition updates to stakeholders/media on conditions
Quarterly Board reports on public communication and water-use efficiency outreach activities	Enhance promotion of ongoing WUE programs/tools; deploy targeted advertising	Conduct issue briefings with elected officials, other key civic and business leaders	Conduct specialized outreach to reduce discretionary outdoor use while minimizing landscape damage	Suspend promotion of long-term WUE programs/ tools to focus on imminent needs
	Increase coordination with member agencies (JPIC meets monthly)	Continue promotion of ongoing WUE programs/tools	Promote available water assistance resources for vulnerable populations; specialized outreach to impacted industries	Continue enhanced coordination with member agencies as needed (daily or weekly briefings or email updates, etc.)
	Initiate regular Board reports on campaign efforts	Enhance coordination with member agencies as needed (weekly email updates, etc.)	Continue enhanced coordination with member agencies as needed	Analyze water use and other data to determine any appropriate supplemental actions
	Analyze water use and other data to determine any appropriate supplemental actions	Analyze water use and other data to determine any appropriate supplemental actions	Analyze water use and other data to determine any appropriate supplemental actions	

Catastrophic Communications

- Implementation of any appropriate strategies and tactics from Levels 1-6
- Shift to messages that reflect emergency condition and need to focus water use on health/safety needs
- Potential joint news release/news event with public health officials or incident commanders to announce condition and explain needed actions
- Ensure ongoing coordination with emergency response services with daily advisories or alerts, etc. as needed; provide regular condition updates to stakeholders/media

Evaluate posting alternate, emergency-themed website home page

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Section 10 Implementation

The WSCP contains actions the Water Authority will take to analyze and respond to shortage conditions. Board-approved policies and procedures are critical to ensure successful implementation of the WSCP. The Board's authority to implement the WSCP includes all facets of implementation, including the authority to activate the WSCP, approve regional shortage levels, and approve potential response actions and response level triggers. This section discusses the Board's role to approve shortage response actions and implement the allocation methodology, the role of the Member Agency Advisory Team (MAAT), and potential revenue impacts from fluctuating water sales.

10.1 Implementation of the Allocation Methodology

In 2021, the Board adopted Resolution 2021-__ that established policies and procedures to administer the M&I water supply allocation methodology. The methodology is contained in Section 7. The resolution addressed the process for setting member agency allocations, including the policies and procedures to do the following:

- Establish a process to set member agency allocations over a 12-month period;
- Provide a timeline for coordinating data collection between the Water Authority and the member agencies for use in calculating allocations;
- Provide procedures whereby a member agency may request a change, or modification, to its Board approved allocation;
- Require the Water Authority General Manager and the MAAT to review all modification requests and provide recommendations;
- Provide for a pass through of any penalties levied by MWD on the Water Authority for exceeding its annual allocation; and
- Provide monthly reports to the MAAT and the Water Authority Board on water use compared to allocations for each member agency, once mandatory cutbacks are required.

The resolution is included in Appendix D and summarized in Sections 10.1.1 through 10.1.5.

10.1.1 Municipal and Industrial Water Supply Allocations

As stated in Resolution 2021-__, the following provisions govern the establishment and adoption of a water supply allocation whenever the Board determines it is necessary to allocate water as provided in the WSCP. This section applies to allocation of water for all uses except PSAWR uses which is discussed in Section 10.1.5.

a. Water Supply Allocation Period

An allocation period shall be for 12 months, from July 1 of a given year through the following June 30, unless otherwise specifically determined by the Board. If the

shortage of supply is related to cutbacks by MWD, it is the intention of the Board that the Water Authority's allocation period be consistent, to the extent feasible, with MWD's 2014 WSAP, or later update of such plan, adopted by MWD.

b. Establish Water Supply Allocation

The General Manager shall establish the recommended supply allocation for each member agency based on the Supply Allocation Methodology included in the WSCP. The three-year base period described in the WSCP shall be determined prior to commencement of the water allocation period and shall include the three most recent consecutive non-allocation fiscal years. Prior to activation of the WSCP, the General Manager shall coordinate with member agencies to obtain and analyze historic data such as, but not limited to, total water use, local water use, and projected local supply, in order to finalize the allocation data to be utilized by the Water Authority in calculating the supply allocation. This coordination shall occur during January through April of a year in which the General Manager determines an allocation may be necessary beginning July 1. During this coordination period, member agencies will have an opportunity to provide updated projections for local supply based upon changes in local supply conditions caused by winter runoff. Member agencies shall provide water use and other information upon request of the General Manager. The ICP, ESP or Emergency Water Delivery Plans shall govern allocations in response to an unanticipated or catastrophic event (See Section 8).

c. Adopt Supply Allocation

The General Manager's recommended allocation shall be submitted to the Water Planning and Environmental and Committee for recommendation to the Board. The determination by the Board of the allocation for each member agency shall be final, subject only to modification by the Board because of significant changes in Water Authority supply conditions or pursuant to Section 10.1.3.

10.1.2 Monthly Water Use Reporting

The General Manager shall provide monthly reports of each member agency's actual imported and local water use data compared to their allocation to the Water Planning and Environmental Committee, MAAT, and the Board. In order to provide an accurate accounting of member agencies' performance, member agencies shall provide monthly total water use data and other information in a timely manner upon request of the General Manager.

10.1.3 Modifications to Supply Allocations Due to Changes in Local Conditions

A member agency may request a modification to its approved allocation based upon new information justifying a recalculation of the allocation because of significant changes in local circumstances (e.g. surface water or local supply changes). Information shall not be considered new if it reasonably could have been made available before the initial establishment of the allocation. The General Manager may initiate a modification to a member agency's allocation at any time if the General Manager determines that information provided

by the member agency was inaccurate or incomplete. Requests for modification that, alone or in the aggregate, total more than 10% of the requesting agency's allocation or greater than 500 AF within a single allocation period must be approved by the Board. All other modification requests are considered minor and may be approved by the General Manager after consultation with the MAAT. For further details on the process, please refer to the resolution in Appendix D.

10.1.4 Reconciliation

Within six months of the end of an allocation period, the General Manager shall conduct a final accounting of member agency deliveries during the allocation period compared with the member agency supply allocations, including any modifications provided in Section 10.1.3. As part of the reconciliation, member agencies shall provide actual local water use for the allocation period and other information upon request of the General Manager. Upon completion of the reconciliation, the General Manager shall notify each member agency of their performance in meeting their supply allocation.

10.1.5 Participants in the Permanent Special Agricultural Water Rate Program

As described in Section 4, PSAWR customer supply allocations are based on cutbacks from MWD. Supply allocations to PSAWR customers shall be established, monitored, and enforced based on MWD's WSAP M&I water supply reduction guidelines and the Water Authority's PSAWR guidelines. If the PSAWR Program is terminated, the Board may allocate water for agriculture according to the methodology provided in the WSCP.

10.2 Water Supply Conditions Report

Upon activation of the WSCP or at other times as requested by the Board, staff prepares monthly updates to the Board and MAAT on state and local water supply conditions. The updates include information on SWP deliveries, storage levels in major state reservoirs, and hydrologic conditions in the Sierra Nevada. The report also includes information on Colorado River hydrologic conditions and local conditions related to water storage levels, rainfall totals, average regional temperatures, and short-term weather outlooks.

10.3 Member Agency Advisory Team

The MAAT will be made up of the general managers of the Water Authority's member agencies or their representatives. The MAAT will focus on decisions related to actions included in the Shortage Response Matrix, including the Allocation Methodology. The intensity of the drought will determine how often the MAAT meets. It may meet infrequently if water is only being withdrawn from storage, or the meetings may be scheduled monthly and possibly more often if the allocation of water begins. Also, during the implementation of the

Shortage Supply Matrix actions, policy issues may arise where the Water Authority's General Manager may desire input from the member agencies before making a recommendation to the Board. The MAAT could be convened at this time to provide input. The policy decisions related to implementation of the matrix actions could include recommendations on:

1. What drought response action(s) to take to avoid allocations;
2. How much to spend to avoid allocations;
3. Modifications to supply allocations; and
4. Modifying a portion of the WSCP that is not working as expected.

The MAAT will also be the body to which a member agency may appeal should the Water Authority's General Manager deny an adjustment during allocations. Should the member agency want to appeal the MAAT's recommendation, it may then ask the Water Authority's Board for a review.

Additionally, the Water Authority's General Manager may wish to convene the advisory team to provide an update on supply conditions or conservation performance during a drought. This meeting may simply be for communication purposes or for further input to develop new programs to help avert the impacts of a drought.

10.4 Revenue Impacts

Activation of the WSCP will result in a reduction in water use and a corresponding reduction in water sales. To address the impact from a reduction in water sales, in FY 1990, the Water Authority created a Rate Stabilization Fund (RSF) to provide funds that would mitigate the need for rate increases in the event of an unexpected decline in water sales. In 2006 and again in 2018, the Board adopted new policies governing the RSF. Under the policy, the RSF has a "target" balance that is the equivalent of the estimated financial impact 2.5 years of wet weather (reduced sales). The new policy also established a maximum RSF balance equal to the financial impact of 3.5 years of wet weather. The policy matches the level of RSF funding with the risk (water sales volatility) that the fund is designed to mitigate. The RSF provides an important tool to mitigate water sales volatility and the impact that has on water rates.

On January 1, 2003, the Water Authority implemented a rate structure that substantially increased the percentage of water revenues generated from fixed charges. This increase replaced the previous variable "postage stamp" rate, which historically generated as much as 80% or more of total annual revenues, with two fixed charges, and one variable rate. The new fixed charges, Customer Service and Storage combined with the Infrastructure Access Charge, provide the Water Authority with enhanced revenue stability. Additionally, in March 2015, the Board adopted the new fixed Supply Reliability Charge. The Supply Reliability Charge recovers a portion of the Lewis Carlsbad Desalination Plant water purchase and IID water transfer supply costs. The fixed charges combined help to mitigate revenue volatility due to changes in either water demand or supply availability and support smooth and predictable rates and charges. As part of the Water Authority's annual rate setting process, the split between fixed and variable revenues is continuously assessed and adjusted to ensure appropriate cost-recovery.

Although the Water Authority maintains strong financial reserves, it is possible that additional loss of revenue associated with demand reduction or costs associated with supply enhancement could negatively affect the Water Authority's short-term financial situation. The Water Authority may compensate for increased costs or reduced water sales by adjusting water rates in succeeding years.

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Appendix A

Carryover Storage Policy Guidelines

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Carryover Storage Policy Guidelines

In December 2016, the Board approved CSP Guidelines to provide policy guidance on how the Water Authority's carryover storage supplies should be managed during supply shortage events and normal (non-shortage) periods to help minimize or avoid potential cutbacks to member agencies during drought. Under the WSCP, carryover supplies can be used under any of the six regional water shortage response levels. The CSP Guidelines are listed below.

Withdrawal of Carryover Supplies during Dry-Year Shortage Events

1. ***The trigger to evaluate utilization of carryover supplies during shortage events is when any of the Water Authority's supplies are cutback and supply is insufficient to meet projected demand***

Should any of the Water Authority's supplies experience a cutback or reduction in deliveries, staff will evaluate the need to withdrawal supplies from carryover storage. This includes potential supply allocations from MWD, reduction in Colorado River transfers or decrease in deliveries from the Carlsbad Desalination Project.

2. ***Any evaluation will initially plan for carryover storage surface supplies to be utilized over five consecutive dry-years***

Under the Urban Water Management Planning Act, agencies are currently required to evaluate supply reliability over three consecutive dry years. The basic planning assumption in the Water Authority's 2015 UWMP is that carryover storage be withdrawn over a three-year period in equal increments. As stated in the DWR 2013 California Water Plan Update: "Climate change could extend California's drought periods and make them worse. Warming temperatures and changes in rainfall and runoff patterns may exacerbate the frequency and intensity of droughts." Using the Sacramento River runoff index to measure annual hydrology within the state, the last three dry cycles have lasted six years (1987-1992), four years (2007-2010) and five years running for the current drought (2012-2016). Without above average runoff in year 2011, the state would have experienced a dry cycle lasting nine years. In identifying ways to improve shortage contingency planning throughout the state, Governor Brown's May 2016 Executive Order requires DWR to update plan requirements to include planning for at least a five-year drought. To ensure that the Water Authority and its member agencies are adequately planning for and responding to future droughts, withdrawal of carryover supplies will be evaluated under five consecutive dry-years of shortage.

3. ***The amount of carryover surface supplies used annually over the five-year period will be handled on a case-by-case basis, with a general guideline of withdrawing surface storage supplies evenly over the five-year period.***

As stated in the Water Authority's 2015 UWMP there are a number of factors to consider when determining the utilization of carryover supplies to reduce or eliminate shortages. The plan states that the storage take amount should be handled on a case-by-case basis, considering such items as, current demand trends, regional and local supply availability, hydrologic conditions, and storage supply available for withdrawal. There are other political issues that could also impact the operation of carryover storage supplies during a shortage event, such as state drought response regulations and activities. For these reasons, the carryover storage policy guidelines should be flexible to allow for the uncertainties and complexities associated with managing supplies during a drought.

As a starting point in the detailed analysis, the general rule will be that surface storage supplies be withdrawn evenly throughout the five-year period. This is a conservative and reliable drought management approach that helps avoid depletion of storage reserves in the early years and lessen severe cutbacks in subsequent years of the shortage event. It is important to note that this is just a general guideline to begin the analysis and actual withdrawals may differ from this rule, providing the Board with flexibility in responding to specific shortage situations.

At the end of five years, if carryover surface water supplies from San Vicente Reservoir are no longer available, deliveries could be made from the Central Valley Groundwater Bank and Emergency Storage Program storage reserves. Deliveries from the Groundwater Bank are made after carryover surface water supplies, because the costs associated with withdrawing supplies from groundwater bank are higher and there are no losses due to evaporation.

4. Supplies taken from carryover storage will be considered a regional supply to be combined with the Water Authority's supplies for delivery to the member agencies' municipal and industrial customers.

Carryover storage supplies are combined with long-term Colorado River transfers and seawater desalination supplies in the Water Authority's system to provide additional regional reliability to each of the Water Authority's member agencies. When determining member agencies' M&I allocations during a shortage, the supplies available to allocate will total both the Water Authority's core supplies and dry-year supplies, such as carryover storage and potential dry-year transfers.

5. Carryover storage supplies will not be available to TSAWR customers

In March 2015, the Water Authority Board approved extending the TSAWR program until December 31, 2020. As part of the program, TSAWR deliveries to the member agencies are exempt from the Storage Charge calculation. In return, agricultural customers receive half the municipal and industrial (M&I) level of service under the Emergency Storage Program and no delivery under the Carryover Storage Program

(CSP). The cutback to TSAWR deliveries during a shortage is equivalent to the cutback level from Metropolitan. In April 2012, the Board approved modifications to the Water Authority's Water Shortage and Drought Response Plan allocation methodology. This included a methodology to ensure that during shortages, CSP deliveries go just to M&I customers.

Evaluation of Carryover Storage Levels during Normal Periods

- 6. *The necessary carryover storage levels maintained during normal periods will be evaluated following a shortage event when carryover supplies have been withdrawn and at least annually by May of each year.***

It is important to often conduct an evaluation of carryover storage levels using updated information to ensure adequate reserves for potential dry-year shortages. If a prolonged shortage situation could be reasonably foreseen within the next two years, staff would work to ensure that carryover storage reserves are full going into a potential drought period. The analysis would be conducted consistent with these policy guidelines and be conducted at the following times:

- After a shortage event to determine how much water, if any, should be put into storage to replenish reserve levels.
- During normal periods, the evaluation will be conducted once a year by May when hydrologic conditions are more certain. As part of this annual evaluation, staff will also conduct a review of emergency storage reserves and provide the Board with an informational report that includes a discussion on both carryover and emergency storage reserves.
- More frequently, if conditions warrant the evaluation.

- 7. *Maintain a target volume of 70,000 AF and maximum volume of 100,000 AF in San Vicente carryover storage reserves during normal (non-shortage) periods to ensure the region is prepared for extended shortages due to drought.***

For financial and supply planning purposes, a target volume is being proposed to ensure the region has stored water, or the ability to purchase additional water for storage, to manage shortage events. The target volume will be re-evaluated on a periodic basis to determine if the amount is appropriate taking into account current water demand trends and supply availability. The initial 70,000 AF target is based on a number of factors, including current regional water demand trends, available local, regional and imported water supplies and the recent shortage evaluation conducted for the region under the State Water Resources Control Board May 2016 Emergency Regulation.

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Appendix B

Model Drought Ordinance

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ORDINANCE NO. _____

**AN ORDINANCE OF [AGENCY] ADOPTING A DROUGHT
RESPONSE CONSERVATION PROGRAM**

WHEREAS, article 10, section 2 of the California Constitution declares that waters of the State are to be put to beneficial use, that waste, unreasonable use, or unreasonable method of use of water be prevented, and that water be conserved for the public welfare; and

WHEREAS, conservation of current water supplies and minimization of the effects of water supply shortages that are the result of drought are essential to the public health, safety, and welfare; and

WHEREAS, regulation of the time of certain water use, manner of certain water use, design of rates, method of application of water for certain uses, installation and use of water-saving devices, provide an effective and immediately available means of conserving water; and

WHEREAS, California Water Code sections 375 et seq. authorize water suppliers to adopt and enforce a comprehensive water conservation program; and

WHEREAS, adoption and enforcement of a comprehensive water conservation program will allow the [AGENCY] to delay or avoid implementing measures such as water rationing or more restrictive water use regulations pursuant to a declared water shortage emergency as authorized by California Water Code sections 350 et seq.; and

WHEREAS, the San Diego County Water Authority has adopted an Urban Water Management Plan that includes water conservation as a necessary and effective component of the Water Authority's programs to provide a reliable supply of water to meet the needs of the Water Authority's 24 member public agencies, including the [AGENCY]. The Water Authority's Urban Water Management Plan also includes a contingency analysis of actions to be taken in response to water supply shortages. This ordinance is consistent with the Water Authority's Urban Water Management Plan; and

WHEREAS, as anticipated by its Urban Water Management Plan, the San Diego County Water Authority, in cooperation and consultation with its member public agencies, has adopted a Water Shortage Contingency Plan, which establishes a progressive program for responding to water supply limitations resulting from drought conditions. This ordinance is intended to be consistent with and to implement the Water Authority's Water Shortage Contingency Plan; and

WHEREAS, the Water Authority's Water Shortage Contingency Plan contains six regional water shortage levels containing regional actions to be taken to lessen or avoid

supply shortages. This ordinance contains drought response levels that correspond with the Water Shortage Contingency Plan levels; and

WHEREAS, the [AGENCY], due to the geographic and climatic conditions within its territory and availability of water provided by the San Diego County Water Authority, may experience shortages due to drought conditions, regulatory restrictions enacted upon imported supplies, and other factors. The [AGENCY] has adopted an Urban Water Management Plan that includes water conservation as a necessary and effective component of its programs to provide a reliable supply of water to meet the needs of the public within its service territory. The [AGENCY's] Urban Water Management Plan also includes a contingency analysis of actions to be taken in response to water supply shortages. This ordinance is consistent with the Urban Water Management Plan adopted by the [AGENCY]; and

WHEREAS, the water conservation measures and progressive restrictions on water use and method of use identified by this ordinance provide certainty to water users and enable [AGENCY] to control water use, provide water supplies, and plan and implement water management measures in a fair and orderly manner for the benefit of the public; and

WHEREAS, this ordinance is intended to be consistent with the [AGENCY's] Water Shortage Contingency Plan.

NOW, THEREFORE, the [LEGISLATIVE BODY] of [AGENCY] does ordain as follows:

SECTION 1.0 DECLARATION OF NECESSITY AND INTENT

(a) This ordinance establishes water management requirements that are in addition to any permanent water waste prohibitions and are necessary to conserve water, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, prevent unreasonable use of water, prevent unreasonable method of use of water within the [AGENCY] in order to assure adequate supplies of water to meet the needs of the public, and further the public health, safety, and welfare, recognizing that water is a scarce natural resource that requires careful management not only in times of drought, but at all times.

(b) This ordinance establishes regulations to be implemented during times of declared water shortages, or declared water shortage emergencies. It establishes six levels of drought response actions to be implemented in times of shortage, with increasing restrictions on water use in response to worsening drought conditions and decreasing available supplies.

(c) Level 1 condition drought response measures are voluntary and will be reinforced through local and regional public education and awareness measures that may be funded in part by [AGENCY]. During drought response condition Levels 2 through 6, all conservation measures and water-use restrictions become mandatory and become increasingly restrictive in order to attain escalating conservation goals.

(d) During a Drought Response Level 2 condition or higher, the water conservation measures and water use restrictions established by this ordinance are mandatory and violations are subject to criminal, civil, and administrative penalties and remedies specified in this ordinance and as provided in [AGENCY] Administrative or Municipal Code.

SECTION 2.0 DEFINITIONS

(a) The following words and phrases whenever used in this chapter shall have the meaning defined in this section:

1. “Grower” refers to those engaged in the growing or raising, in conformity with recognized practices of husbandry, for the purpose of commerce, trade, or industry, or for use by public educational or correctional institutions, of agricultural, horticultural or floricultural products, and produced: (1) for human consumption or for the market, or (2) for the feeding of fowl or livestock produced for human consumption or for the market, or (3) for the feeding of fowl or livestock for the purpose of obtaining their products for human consumption or for the market. “Grower” does not refer to customers who purchase water subject to the Water Authority’s Permanent Special Agricultural Water Rate Program.
2. “Water Authority” means the San Diego County Water Authority.
3. “Metropolitan” means the Metropolitan Water District of Southern California.
4. “Permanent water use efficiency measures” means any permanent water use efficiency measure adopted by [AGENCY] Board of Directors.
5. “Person” means any natural person, corporation, public or private entity, public or private association, public or private agency, government agency or institution, school district, college, university, or any other user of water provided by the [AGENCY].
6. “WSCP” means the Water Authority’s Water Shortage Contingency Plan or [AGENCY’s] Water Shortage Contingency Plan, as specified, in existence on the effective date of this ordinance and as readopted or amended from time to time, or an equivalent plan of the Water Authority to manage or allocate supplies during shortages.

SECTION 3.0 APPLICATION

- (a) The provisions of this ordinance apply to any person in the use of any water provided by the [AGENCY].
- (b) This ordinance is intended solely to further the conservation of water. It is not intended to implement any provision of federal, State, or local statutes, ordinances, or regulations relating to protection of water quality or control of drainage or runoff. Refer to the local jurisdiction or Regional Water Quality Control Board for information on any stormwater ordinances and stormwater management plans.
- (c) Nothing in this ordinance is intended to affect or limit the ability of the [AGENCY] to declare and respond to an emergency, including an emergency that affects the ability of the [AGENCY] to supply water.
- (d) The provisions of this ordinance do not apply to use of water from private wells or to recycled water.
- (e) Nothing in this ordinance shall apply to use of water that is subject to a special supply program, such as the Water Authority's Permanent Special Agricultural Water Rate Program. Violations of the conditions of special supply programs are subject to the penalties established under the applicable program. A person using water subject to a special supply program and other water provided by the [AGENCY] is subject to this ordinance in the use of the other water.

SECTION 4.0 CORRELATION BETWEEN WATER SHORTAGE CONTINGENCY PLAN AND DROUGHT RESPONSE LEVELS

- (a) The correlation between the Water Authority's WSCP shortage levels and the [AGENCY'S] drought response levels identified in this ordinance is described herein. Under WSCP Shortage Level 1, the [AGENCY] would implement Drought Response Level 1 actions. Under WSCP Shortage Level 2, the [AGENCY] would implement Drought Response Level 1 and Level 2 actions. Under WSCP Shortage Levels 3, the [AGENCY] would implement Drought Response Level 1, Level 2, and Level 3 actions. Under WSCP Level 4, the [AGENCY] would implement Drought Response Level 1, Level 2, Level 3, and Level 4 actions. Under WSCP Level 5, the [AGENCY] would implement Drought Response Level 1, Level 2, Level 3, Level 4, and Level 5 actions. Under WSCP Level 6, the [AGENCY] would implement Drought Response Level 1, Level 2, Level 3, Level 4, Level 5, and Level 6 actions.

(b) The drought response levels identified in this ordinance correspond with the Water Authority WSCP as identified in the following table:

Drought Ordinance Response/WSCP Shortage Levels	Use Restrictions	Conservation Target
1	Voluntary	Up to 10%
2	Mandatory	Up to 20%
3	Mandatory	Up to 30%
4	Mandatory	Up to 40%
5	Mandatory	Up to 50%
6	Mandatory	Above 50%

SECTION 5.0 PERMANENT WATER EFFICIENCY MEASURES

(a) [AGENCY] adopted permanent water use efficiency measures and restrictions on [DATE]. Those measures and restrictions are the following:

1. [MEASURES AND RESTRICTIONS].

SECTION 6.0 DROUGHT RESPONSE LEVEL 1

(a) A Drought Response Level 1 condition applies when the Water Authority notifies its member agencies that due to drought or other supply reductions, there is a reasonable probability there will be supply shortages and that a consumer demand reduction of up to 10% is required in order to ensure that sufficient supplies will be available to meet anticipated demands. The General Manager shall declare the existence of a Drought Response Level 1 and take action to implement the Level 1 conservation practices identified in this ordinance.

(b) During a Drought Response Level 1 condition, [AGENCY] will increase its public education and outreach efforts to emphasize increased public awareness of the need to implement the following water conservation practices. [The same water conservation practices become mandatory if [AGENCY] declares a Level 2 Drought Alert condition]:

1. Stop washing down paved surfaces, including but not limited to sidewalks, driveways, parking lots, tennis courts, or patios, except when it is necessary to alleviate safety or sanitation hazards.
2. Stop water waste resulting from inefficient landscape irrigation, such as runoff, low head drainage, or overspray, etc. Similarly, stop water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.

3. Irrigate residential and commercial landscape before 10 a.m. and after 6 p.m. only. Watering is permitted at any time when a drip/micro-irrigation system/equipment is used.
4. Use a hand-held hose equipped with a positive shut-off nozzle or bucket to water landscaped areas, including trees and shrubs located on residential and commercial properties that are not irrigated by a landscape irrigation system.
5. Irrigate nursery and commercial grower's products before 10 a.m. and after 6 p.m. only. Watering is permitted at any time with a hand-held hose equipped with a positive shut-off nozzle, a bucket, or when a drip/micro-irrigation system/equipment is used. Irrigation of nursery propagation beds is permitted at any time. Watering of livestock is permitted at any time.
6. Use re-circulated water to operate ornamental fountains.
7. Wash vehicles using a bucket and a hand-held hose with positive shut-off nozzle, mobile high pressure/low volume wash system, or at a commercial site that re-circulates (reclaims) water on-site. Avoid washing during hot conditions when additional water is required due to evaporation.
8. Serve and refill water in restaurants, bars, and other food service establishments only upon request.
9. Offer guests in hotels, motels, and other commercial lodging establishments the option of not laundering towels and linens daily.
10. Repair all water leaks within five (5) days of notification by the [AGENCY] unless other arrangements are made with the General Manager.
11. Use recycled or non-potable water for construction purposes when available and economically feasible.

(c) During a Drought Response Level 2 condition or higher, all persons shall be required to implement the conservation practices established in a Drought Response Level 1 condition.

SECTION 7.0 DROUGHT RESPONSE LEVEL 2

(a) A Drought Response Level 2 condition applies when the Water Authority notifies its member agencies that due to cutbacks caused by drought or other reduction in supplies, a consumer demand reduction of up to 20% is required in order to have sufficient supplies available to meet anticipated demands. The [AGENCY] Board of Directors shall declare the existence of a Drought Response Level 2 condition and implement the mandatory Level 2 conservation measures identified in this ordinance.

(b) All persons using [AGENCY] water shall comply with Level 1 water conservation practices during a Drought Response Level 2 condition, and shall also comply with the following additional conservation measures:

1. Limit residential and commercial landscape irrigation to no more than three (3) assigned days per week on a schedule established by the General Manager and posted by the [AGENCY]. This section shall not apply to commercial growers or nurseries.
2. Limit lawn watering and landscape irrigation using sprinklers to no more than ten (10) minutes per watering station per assigned day. This provision does not apply to landscape irrigation systems using water efficient devices, including but not limited to: weather based controllers, drip/micro-irrigation systems and stream rotor sprinklers.
3. Water landscaped areas, including trees and shrubs located on residential and commercial properties, and not irrigated by a landscape irrigation system governed by Section 7(b)(2), on the same schedule set forth in Section 7(b)(1) by using a bucket, hand-held hose with positive shut-off nozzle, or low-volume non-spray irrigation.
4. Repair all leaks within seventy-two (72) hours of notification by the [AGENCY] unless other arrangements are made with the General Manager.
5. Stop operating ornamental fountains or similar decorative water features unless recycled water is used.

SECTION 8.0 DROUGHT RESPONSE LEVEL 3 – DROUGHT CRITICAL CONDITION

(a) A Drought Response Level 3 condition applies when the Water Authority notifies its member agencies that due to increasing cutbacks caused by drought or other reduction of supplies, a consumer demand reduction of up to 30% is required in order to have sufficient supplies available to meet anticipated demands. The [AGENCY] Board of Directors shall declare the existence of a Drought Response Level 3 condition and implement the Level 3 conservation measures identified in this ordinance.

(b) All persons using [AGENCY] water shall comply with Level 1 and Level 2 water conservation practices during a Drought Response Level 3 condition and shall also comply with the following additional mandatory conservation measures:

1. Limit residential and commercial landscape irrigation to no more than two (2) assigned days per week on a schedule established by the General Manager and posted by the [AGENCY]. This section shall not apply to commercial growers or nurseries.

2. Water landscaped areas, including trees and shrubs located on residential and commercial properties, and not irrigated by a landscape irrigation system governed by section 7(b)(2), on the same schedule set forth in section 8(b)(1) by using a bucket, hand-held hose with a positive shut-off nozzle, or low-volume non-spray irrigation.

3. Stop washing vehicles except at commercial carwashes that recirculate water, or by high pressure/low volume wash systems.

4. Repair all leaks within forty-eight (48) hours of notification by the [AGENCY] unless other arrangements are made with the General Manager.

(c) Upon the declaration of a Drought Response Level 3 condition, [AGENCY] will suspend consideration of annexations to its service area.

(d) The [AGENCY] may establish a water allocation for property served by the [AGENCY] using a method that does not penalize persons for the implementation of conservation methods or the installation of water saving devices. If the [AGENCY] establishes a water allocation it shall provide notice of the allocation by including it in the regular billing statement for the fee or charge or by any other mailing to the address to which the [AGENCY] customarily mails the billing statement for fees or charges for on-going water service. Following the effective date of the water allocation as established by the [AGENCY], any person that uses water in excess of the allocation shall be subject to a penalty in the amount of \$___ for each billing unit of water in excess of the allocation. The penalty for excess water usage shall be cumulative to any other remedy or penalty that may be imposed for violation of this ordinance.

SECTION 9.0 DROUGHT RESPONSE LEVEL 4

(a) A Drought Response Level 4 condition applies when the Water Authority notifies its member agencies that due to increasing cutbacks caused by drought or other reduction of supplies, a consumer demand reduction of up to 40% is required in order to have sufficient supplies available to meet anticipated demands. The [AGENCY] Board of Directors shall declare the existence of a Drought Response Level 4 condition and implement the Level 4 conservation measures identified in this ordinance.

(b) All persons using [AGENCY] water shall comply with Level 1, Level 2, and Level 3 water conservation practices during a Drought Response Level 4 condition and shall also comply with the following additional mandatory conservation measures:

1. Stop filling or re-filling ornamental lakes or ponds, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a drought response level under this ordinance.

SECTION 10.0 DROUGHT RESPONSE LEVEL 5

(a) A Drought Response Level 5 condition applies when the Water Authority notifies its member agencies that due to increasing cutbacks caused by drought or other reduction of supplies, a consumer demand reduction of up to 50% is required in order to have sufficient supplies available to meet anticipated demands. The [AGENCY] Board of Directors shall declare the existence of a Drought Response Level 5 condition and implement the Level 5 conservation measures identified in this ordinance.

(b) All persons using [AGENCY] water shall comply with conservation measures required during Level 1, Level 2, Level 3, and Level 4 conditions and shall also comply with the following additional mandatory conservation measures:

1. Stop all landscape irrigation, except crops and landscape products of commercial growers and nurseries. This restriction shall not apply to the following categories of use unless the [AGENCY] has determined that recycled water is available and may be lawfully applied to the use.

A. Maintenance of trees and shrubs that are watered on the same schedule set forth in section 8(b)(1) by using a bucket, hand-held hose with a positive shut-off nozzle, or low-volume non-spray irrigation;

B. Maintenance of existing landscaping necessary for fire protection as specified by the Fire Marshal of the local fire protection agency having jurisdiction over the property to be irrigated;

C. Maintenance of existing landscaping for erosion control;

D. Maintenance of plant materials identified to be rare or essential to the well-being of rare animals;

E. Maintenance of landscaping within active public parks and playing fields, day care centers, school grounds, cemeteries, and golf course greens, provided that such irrigation does not exceed two (2) days per week according to the schedule established under section 8(b)(1);

F. Watering of livestock; and

G. Public works projects and actively irrigated environmental mitigation projects.

2. Repair all water leaks within twenty-four (24) hours of notification by the [AGENCY] unless other arrangements are made with the General Manager.

(c) The [AGENCY] may establish a water allocation for property served by the [AGENCY]. If the [AGENCY] establishes a water allocation it shall provide notice of

the allocation by including it in the regular billing statement for the fee or charge or by any other mailing to the address to which the [AGENCY] customarily mails the billing statement for fees or charges for on-going water service. Following the effective date of the water allocation as established by the [AGENCY], any person that uses water in excess of the allocation shall be subject to a penalty in the amount of \$___ for each billing unit of water in excess of the allocation. The penalty for excess water usage shall be cumulative to any other remedy or penalty that may be imposed for violation of this ordinance.

(d) Upon the declaration of a Drought Response Level 5 condition, no new potable water service shall be provided, no new temporary meters or permanent meters shall be provided, and no statements of immediate ability to serve or provide potable water service (such as, will serve letters, certificates, or letters of availability) shall be issued, except under the following circumstances:

1. A valid, unexpired building permit has been issued for the project;
or
2. The project is necessary to protect the public's health, safety, and welfare; or
3. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of [AGENCY].

This provision shall not be construed to preclude the resetting or turn-on of meters to provide continuation of water service or to restore service that has been interrupted for a period of one year or less.

SECTION 11.0 DROUGHT RESPONSE LEVEL 6

(a) A Drought Response Level 6 condition applies when the Water Authority Board of Directors declares a water shortage emergency pursuant to California Water Code Section 350 and notifies its member agencies that Level 6 requires a demand reduction of more than 50% in order for the [AGENCY] to have maximum supplies available to meet anticipated demands. The [AGENCY] shall declare a Drought Emergency in the manner and on the grounds provided in California Water Code section 350.

(b) All persons using [AGENCY] water shall comply with conservation measures required during Level 1, Level 2, Level 3, Level 4, and Level 5 conditions and shall also comply with the following additional mandatory conservation measures:

1. Stop all landscape irrigation, except crops and landscape products of commercial growers and nurseries. This restriction shall not apply to the following categories of use

unless the [AGENCY] has determined that recycled water is available and may be lawfully applied to the use.

- A. Maintenance of existing landscaping necessary for fire protection as specified by the Fire Marshal of the local fire protection agency having jurisdiction over the property to be irrigated;
- B. Maintenance of existing landscaping for erosion control;
- C. Maintenance of plant materials identified to be rare or essential to the well-being of rare animals;
- D. Watering of livestock; and
- E. Public works projects and actively irrigated environmental mitigation projects.

SECTION 12.0 PROCEDURES FOR DETERMINATION AND NOTIFICATION OF DROUGHT RESPONSE LEVEL

(a) The existence of a Drought Response Level 1 condition may be declared by the General Manager upon a written determination of the existence of the facts and circumstances supporting the determination. A copy of the written determination shall be filed with the Clerk or Secretary of the [AGENCY] and provided to the [AGENCY] Board of Directors. The General Manager may publish a notice of the determination of existence of Drought Response Level 1 condition in one or more newspapers, including a newspaper of general circulation within the [AGENCY]. The [AGENCY] may also post notice of the condition on their website.

(b) The existence of Drought Response Level 2, Level 3, Level 4, or Level 5 conditions, may be declared by resolution of the [AGENCY] Board of Directors adopted at a regular or special public meeting held in accordance with State law. The mandatory conservation measures applicable to Drought Response Level 2, Level 3, Level 4, or Level 5 conditions, shall take effect on the tenth (10) day after the date the response level is declared. Within five (5) days following the declaration of the response level, the [AGENCY] shall publish a copy of the resolution in a newspaper used for publication of official notices. If the [AGENCY] establishes a water allocation, it shall provide notice of the allocation by including it in the regular billing statement for the fee or charge or by any other mailing to the address to which the [AGENCY] customarily mails the billing statement for fees or charges for on-going water service. Water allocation shall be effective on the fifth (5) day following the date of mailing or at such later date as specified in the notice.

(c) The existence of a Drought Response Level 6 condition may be declared in accordance with the procedures specified in California Water Code Sections 351 and

352. The mandatory conservation measures applicable to Drought Response Level 6 conditions shall take effect on the tenth (10) day after the date the response level is declared. Within five (5) days following the declaration of the response level, the [AGENCY] shall publish a copy of the resolution in a newspaper used for publication of official notices.

(d) The [AGENCY] Board of Directors may declare an end to a Drought Response Level by the adoption of a resolution at any regular or special meeting held in accordance with State law.

SECTION 13.0 HARSHIP VARIANCE

(a) If, due to unique circumstances, a specific requirement of this ordinance would result in undue hardship to a person using agency water or to property upon which agency water is used, that is disproportionate to the impacts to [AGENCY] water users generally or to similar property or classes of water uses, then the person may apply for a variance to the requirements as provided in this section.

(b) The variance may be granted or conditionally granted, only upon a written finding of the existence of facts demonstrating an undue hardship to a person using agency water or to property upon with agency water is used, that is disproportionate to the impacts to [AGENCY] water users generally or to similar property or classes of water use due to specific and unique circumstances of the user or the user's property.

1. Application. Application for a variance shall be a form prescribed by [AGENCY] and shall be accompanied by a non-refundable processing fee in an amount set by resolution of the [AGENCY] Board of Directors.

2. Supporting Documentation. The application shall be accompanied by photographs, maps, drawings, and other information, including a written statement of the applicant.

3. Required Findings for Variance. An application for a variance shall be denied unless the approving authority finds, based on the information provided in the application, supporting documents, or such additional information as may be requested, and on water use information for the property as shown by the records of the [AGENCY], all of the following:

A. That the variance does not constitute a grant of special privilege inconsistent with the limitations upon other [AGENCY] customers.

B. That because of special circumstances applicable to the property or its use, the strict application of this ordinance would have a disproportionate impact on the property or use that exceeds the impacts to customers generally.

C. That the authorizing of such variance will not be of substantial detriment to adjacent properties, and will not materially affect the ability of the [AGENCY] to effectuate the purpose of this chapter and will not be detrimental to the public interest.

D. That the condition or situation of the subject property or the intended use of the property for which the variance is sought is not common, recurrent, or general in nature.

4. Approval Authority. The General Manager shall exercise approval authority and act upon any completed application no later than ten (10) days after submittal and may approve, conditionally approve, or deny the variance. The applicant requesting the variance shall be promptly notified in writing of any action taken. Unless specified otherwise at the time a variance is approved, the variance applies to the subject property during the term of the mandatory drought response.

5. Appeals to [AGENCY] Board of Directors. An applicant may appeal a decision or condition of the General Manager on a variance application to the [AGENCY] Board of Directors within ten (10) days of the decision upon written request for a hearing. The request shall state the grounds for the appeal. At a public meeting, the [AGENCY] Board of Directors shall act as the approval authority and review the appeal de novo by following the regular variance procedure. The decision of the [AGENCY] Board of Directors is final.

SECTION 14.0 VIOLATIONS AND PENALTIES

(a) Any person, who uses, causes to be used, or permits the use of water in violation of this ordinance is guilty of an offense punishable as provided herein.

(b) Each day that a violation of this ordinance occurs is a separate offense.

(c) Administrative fines may be levied for each violation of a provision of this ordinance as follows:

1. ____ dollars for a first violation.
2. ____ dollars for a second violation of any provision of this ordinance within one year.
3. ____ dollars for each additional violation of this ordinance within one year.

(d) Violation of a provision of this ordinance is subject to enforcement through installation of a flow-restricting device in the meter.

(e) Each violation of this ordinance may be prosecuted as a misdemeanor punishable by imprisonment in the county jail for not more than thirty (30) days or by a fine not exceeding \$1,000, or by both as provided in Water Code Section 377.

(f) Willful violations of the mandatory conservation measures and water use restrictions as set forth in Section 11.0 and applicable during a Drought Response Level 6 condition may be enforced by discontinuing service to the property at which the violation occurs as provided by Water Code Section 356.

(g) All remedies provided for herein shall be cumulative and not exclusive.

SECTION 15.0 EFFECTIVE DATE

This ordinance is effective immediately upon adoption or as otherwise established by State law for [AGENCY].

Any part or provision of this Ordinance that is prohibited or that is held to be void or unenforceable shall be ineffective to the extent of such prohibition or unenforceability without invalidating the remaining provisions hereof.

PASSED, APPROVED AND ADOPTED this [DATE] by the following vote:

AYES;

NOES:

ABSTAIN:

ABSENT:

[President/Chair of Legislative Body]

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Appendix C

Examples of Additional Customer Water Use Prohibitions

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Examples of Additional Customer Water Use Prohibitions

The severity of water use prohibitions varies depending on the required reduction in water use. Below are examples of potential water use prohibitions that could be considered for inclusion in a retail water supplier's drought ordinance. The prohibitions are grouped into residential and non-residential categories.

Examples of Potential Residential Prohibitions

Landscape

- The application of potable water to landscapes in a manner that causes runoff onto adjacent property or impervious surfaces, including, but not limited to, walkways, roadways, parking lots, or structures, is prohibited.
- The irrigation of residential landscapes is prohibited between 10 a.m. and 6 p.m. Supervised testing or repairing of irrigation systems is exempt.
- The application of potable water to landscapes during and within 48 hours after measurable rainfall is prohibited.
- The use a hand-held hose that is not equipped with a positive shut-off nozzle to water landscaped areas is prohibited. The use of a bucket is exempt.
- The irrigation with potable water of landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development is prohibited.
- The weekly irrigation of landscapes in excess of the number of watering days assigned by the water supplier is prohibited.
- The use of sprinklers to irrigate landscape for more than ten minutes per watering station per day is prohibited. This prohibition does not apply to landscape irrigation systems using water efficient devices, including, but not limited to, weather-based controllers, drip/micro-irrigation systems, and stream rotor sprinklers.
- The irrigation of landscapes more than once per week during the months of November through May is prohibited.
- The use of irrigation to establish new landscapes is allowed at any time for up to two months if the landscape is water efficient and replaced turf or another high

water use landscape, or if the new landscape is water efficient and is required for a landscape permit.

- Irrigation is allowed at any time as required by a landscape permit for erosion control, establishment, repair, renovation of public use fields for schools and parks, and for landscape following a disaster (up to two months with a hardship variance).
- Over-seeding of turf is prohibited.
- All landscape irrigation is prohibited, with the following exceptions for use:
 - Maintenance of trees and shrubs that are watered by using a bucket, hand-held hose with a positive shut-off nozzle, or low-volume non-spray irrigation.
 - Maintenance of existing landscaping necessary for fire protection as specified by the Fire Marshal of the local fire protection agency having jurisdiction over the property to be irrigated.
 - Maintenance of existing landscaping for erosion control.
 - Maintenance of plant materials identified to be rare or essential to the well-being of rare animals.
 - Watering of livestock.

Power Washing

- Power washing of exterior surfaces, such as siding, is prohibited.
- Power washing of impervious surfaces is prohibited, including, but not limited to, sidewalks, driveways, parking lots, tennis courts, or patios. Power washing to alleviate safety or sanitation hazards is exempt.

Vehicle Washing

- The use of a hose that dispenses potable water to wash vehicles, except where the hose is fitted with a positive shut-off nozzle, is prohibited.
- Washing vehicles is prohibited, except at commercial carwashes that recirculate (reuse) the water.

Fountains/Decorative Water Features

- The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system or to the extent needed for maintenance, is prohibited.

Leak Detection and Repair

- Repair all water leaks within 24 hours of notification by the water supplier unless other arrangements are made with the water supplier.
- Water service shall be shut-off if there are noticeable leaks on the customer's side of the meter.

Swimming Pools/Ponds

- Filling or refilling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a drought response level under this ordinance.
- Pools and spas must be covered during non-use.
- Pool filling is prohibited.
- Draining swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, is prohibited.

Example of Potential Non-Residential Prohibitions

Landscape

- The application of potable water to landscapes in a manner that causes runoff onto adjacent property or impervious surfaces, including, but not limited to, walkways, roadways, parking lots, or structures, is prohibited.
- Irrigation of commercial landscapes is prohibited between 10 a.m. and 6 p.m. Public and private golf course greens and tees and professional sports fields are exempt and may be irrigated in order to maintain play areas and accommodate event schedules. Supervised testing or repairing of irrigation systems is allowed anytime with proper signage.
- Application of potable water to landscapes during and within 48 hours after measurable rainfall is prohibited.
- Use of a hand-held hose that is not equipped with a positive shut-off nozzle to water landscaped areas is prohibited. The use of a bucket to water landscaped areas is exempt.
- Irrigation of nursery and commercial grower's products is prohibited between 10 a.m. and 6 p.m. Watering with a hand-held hose equipped with a positive shut-off nozzle, a bucket, or when a drip/micro-irrigation system/equipment is used is exempt. Also exempt is irrigation of nursery propagation beds and watering of

livestock.

- The irrigation with potable water of ornamental turf on public street medians is prohibited.
- The irrigation with potable water of landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development is prohibited.
- The weekly irrigation of landscapes in excess of the number of watering days assigned by the water supplier is prohibited. The irrigation of landscapes more than once per week during the months of November through May is prohibited. This prohibition shall not apply to commercial growers or nurseries.
- The use of sprinklers to irrigate landscape for more than ten minutes per watering station per day is prohibited. This prohibition does not apply to landscape irrigation systems using water efficient devices, including, but not limited to, weather-based controllers, drip/micro-irrigation systems, and stream rotor sprinklers.
- Landscaped areas, including trees and shrubs not irrigated by a landscape irrigation system, must be watered by using a bucket, hand-held hose with positive shut-off nozzle, or low-volume non-spray irrigation.
- All landscape irrigation is prohibited, with the following exceptions for use:
 - Water for crops and landscape products of commercial growers and nurseries.
 - Maintenance of trees and shrubs that are watered by using a bucket, hand-held hose with a positive shut-off nozzle, or low-volume non-spray irrigation.
 - Maintenance of existing landscaping necessary for fire protection as specified by the Fire Marshal of the local fire protection agency having jurisdiction over the property to be irrigated.
 - Maintenance of existing landscaping for erosion control.
 - Maintenance of landscaping within active public parks and playing fields, day-care centers, school grounds, cemeteries, and golf course greens.
 - Maintenance of plant materials identified to be rare or essential to the well-being of rare animals.
 - Public works projects and actively irrigated environmental mitigation projects.
 - Watering of livestock.
- The use of irrigation to establish new landscapes is allowed at any time for up to two months if the landscape is water efficient and replaced turf or another high water use landscape, or if the new landscape is water efficient and is required for a landscape permit.

- Irrigation is allowed at any time as required by a landscape permit for erosion control, establishment, repair, renovation of public use fields for schools and parks, and for landscape following a disaster (up to two months with a hardship variance).
- Over-seeding of turf is prohibited.

Power Washing

- Power washing of exterior surfaces, such as siding, is prohibited.
- Power washing of impervious surfaces is prohibited, including, but not limited to, sidewalks, driveways, parking lots, tennis courts, or patios. Power washing to alleviate safety or sanitation hazards is exempt.

Swimming Pools/Ponds

- Filling or refilling ornamental lakes or ponds is prohibited, except to the extent needed to sustain aquatic life, provided that such animals are of significant value and have been actively managed within the water feature prior to declaration of a drought response level under this ordinance.
- Pools and spas must be covered during non-use.
- Pool filling is prohibited.
- Draining swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, is prohibited.

Vehicle Washing

- The use of a hose that dispenses potable water to wash vehicles, except where the hose is fitted with a positive shut-off nozzle, is prohibited.
- Washing vehicles is prohibited, except at commercial carwashes that recirculate (reuse) the water.
- Non-recirculating systems in all new conveyor car wash systems are prohibited.

Fountains/Decorative Water Features

- The use of potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system or to the extent needed for maintenance, is prohibited.

Cooling Systems

- Single-pass through cooling systems as part of new construction are prohibited.

Hotels/Motels/Restaurants

- Eating or drinking establishments, including, but not limited to restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served and/or purchased, are prohibited from serving drinking water unless requested.
- Hotels, motels, and other commercial lodging establishments shall provide guests with the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

Leak Repair

- Repair all water leaks within 24 hours of notification by the member agency unless other arrangements are made with the water supplier.
- Water service shall be shut-off if there are noticeable leaks on the customer's side of the meter.

Construction

- Recycled or non-potable water must be used for construction purposes when available.
- The use of unnecessary water for construction purposes is prohibited.

Water Service

- No new potable water service shall be provided, no new temporary meters or permanent meters shall be provided, and no statements of immediate ability to serve or provide potable water service (such as, will-serve letters, certificates or letters of availability) shall be issued, except under the following circumstances:
 - A valid, unexpired building permit has been issued for the project; or
 - The project is necessary to protect the public's health, safety, and welfare; or
 - The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the water supplier.
 - This provision shall not be construed to prohibit the resetting or turn-on of meters to provide continuation of water service or to restore service that has been interrupted for a period of one year or less.

- Annexations to a water supplier's service area shall not be considered.
- The water supplier shall establish a water allocation for each parcel using a method that does not penalize persons for the implementation of conservation methods or the installation of water saving devices.
- Flushing sewers or hydrants with potable water is prohibited, except in cases of emergency or for essential operations.

Laundromats

- All laundromats shall have converted 100% of washers to high-efficiency washers by [date TBD].
- The installation of non-recirculating laundry systems is prohibited.

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Appendix D

Water Authority Board Resolution 2021-__

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RESOLUTION NO. 2021-_____

A RESOLUTION OF THE SAN DIEGO COUNTY WATER AUTHORITY ESTABLISHING
PROCEDURES AND POLICIES FOR ADMINISTRATION OF THE WATER SHORTAGE
CONTINGENCY PLAN WATER SUPPLY ALLOCATION METHODOLOGY

WHEREAS, pursuant to the County Water Authority Act, the San Diego County Water Authority exists to provide, as far as practicable, each of its member agencies with reliable and adequate supplies of water to meet their needs, and to establish reasonable rules, regulations and restrictions for the allocation of available supplies for the greatest public interest and benefit; and

WHEREAS, the water supply needs of Water Authority member agencies includes supplies to serve current demands and reasonably anticipated future demands; and

WHEREAS, providing a reliable water supply includes the obligation to manage water and use of water; and

WHEREAS, on _____, 2021, the Water Authority Board of Directors approved a Water Shortage Contingency Plan of specific actions to be taken by the Water Authority and its member agencies during anticipated or actual water supply shortages; and

WHEREAS, the Water Shortage Contingency Plan establishes the methodology by which with the Water Authority will allocate supplies under various supply reduction scenarios; and

WHEREAS, the Water Authority Board of Directors desires to establish administrative procedures and policies for implementation of the allocation methodology established by the Water Shortage Contingency Plan;

NOW, THEREFORE, the Board of Directors of the San Diego County Water Authority resolves as follows:

Section 1. Municipal and Industrial Water Supply Allocations

The provisions of this section shall govern the establishment and adoption of a water supply allocation whenever the Water Authority Board of Directors determines it is necessary to allocate water as provided in the Water Shortage Contingency Plan. This section applies to allocation of water for all uses except Permanent Special Agricultural Water Rate Program uses which are subject to Section 6 of this resolution.

a. Water Supply Allocation Period

An allocation period shall be for 12 months, from July 1 of a given year through the following June 30, unless otherwise specifically determined by the Board. It is the intention of the Board of Directors that the Water Authority's allocation period be consistent, to the extent feasible, with the Metropolitan Water District of Southern California December 2014 Water Supply Allocation Plan, or later update of such plan, adopted by the Metropolitan Water District of Southern California.

b. Establish Water Supply Allocation

The General Manager shall establish the supply allocation for each member agency based on the Supply Allocation Methodology included in the Water Authority's Water Shortage Contingency Plan. The three-year base period described in the Water Shortage Contingency Plan shall be determined prior to commencement of the water allocation period and shall include the three most recent consecutive non-allocation years. The General Manager shall coordinate with member agencies to obtain and analyze historic data such as, but not limited to, total water use, local water use, new meters assessed a capacity charge, conservation savings and projected local supply, in order to finalize the allocation data to be utilized by the Water Authority in calculating the supply allocation. This coordination shall occur during January through April of a year in which the General Manager determines an allocation may be necessary beginning July 1. During this coordination period, member agencies will have an opportunity to provide updated projections for local supply based upon changes in local supply conditions caused by winter runoff. Member agencies shall provide water use and other information upon request of the

General Manager. The Integrated Contingency Plan, Emergency Storage Project or Emergency Water Delivery Plans shall govern allocations in response to an unanticipated or catastrophic event.

c. Adoption Supply Allocation

The General Manager's recommendation for allocation shall be submitted to the Water Planning and Environmental Committee for recommendation to the Board of Directors. The determination by the Board of Directors of the allocation for each member agency shall be final, subject only to modification by the Board of Directors because of significant changes in Water Authority supply conditions or pursuant to Section 3.

Section 2. Monthly Reporting

The General Manager shall provide monthly reports of each member agency's actual Water Authority deliveries to their allocation to the Water Planning and Environmental Committee, Member Agency Advisory Team, and the Board of Directors. In order to provide an accurate accounting of member agencies' performance, member agencies shall provide monthly total water use data and other information in a timely manner upon request of the General Manager.

Section 3. Modifications to Supply Allocations Due to Changes in Local Conditions

A member agency may request a modification to its approved allocation based upon new information justifying a recalculation of the allocation because of significant changes in local circumstances (e.g. surface water or local supply changes). Information shall not be considered new if it reasonably could have been made available before the initial establishment of the allocation. The General Manager may initiate a modification to a member agency's allocation at any time if the General Manager determines that information provided by the member agency was inaccurate or incomplete. Requests for modification that, alone or in the aggregate, total more than 10% of the requesting agency's allocation or greater than 500 acre-feet within a single allocation period must be approved by the Board of Directors. All other modification requests

are considered minor and may be approved by the General Manager after consultation with the Member Agency Advisory Team.

A member agency may initiate a request for modification by providing written notice and supporting documentation to the General Manager no later than December 30 within an allocation period running from July 1 to June 30. The General Manager shall review the request and provide a written response supporting or opposing the modification, and the reasons for support or opposition, within 30 days of the member agency request.

The Member Agency Advisory Team shall review the Member agency request and the General Manager's written response prior to making a recommendation regarding the modification. The Member Agency Advisory Team shall consider all circumstances surrounding the request, including the period of time impacted by the changed local circumstances. If the Member Agency Advisory Team recommends approval or modified approval of the determination, the General Manager shall forward the modification to the Board of Directors for final action, with the exception of minor modifications which become effective upon approval by the General Manager.

If the Member Agency Advisory Team denies a request for modification, the member agency may request, within five days, an appeal of the Member Agency Advisory Team decision to the Board of Directors at the next regular Board Meeting that is not less than 20 days from the date of the Member Agency Advisory Team recommendation. The decision of the Board of Directors is final.

Section 4. Reconciliation

Within six months of the end of an allocation period, the General Manager shall conduct a final accounting of member agency deliveries during the allocation period compared with the member agency supply allocations, including any modifications provided in Section 3 of this resolution. As part of the reconciliation, member agencies shall provide actual local water use for the allocation period and other information upon request of the General Manager. Upon

completion of the reconciliation, the General Manager shall notify each member agency of their performance in meeting their supply allocation.

Section 5. Monetary Penalties from MWD

The Water Authority is subject to monetary penalties imposed by Metropolitan Water District of Southern California in the event it exceeds its annual water allocation from Metropolitan Water District of Southern California. Upon the Water Authority's reconciliation of its own water supply allocation as described in Section 4, any Metropolitan Water District of Southern California penalties levied upon the Water Authority shall in turn be assessed on a pro rata basis to the Water Authority member agencies that exceeded their Water Authority allocation.

Section 6. Exemption for Participants in the Permanent Special Agricultural Water Rate Program

Supply allocations to Permanent Special Agricultural Water Rate Program customers shall be established, monitored, and enforced based Ordinance No. 2020-04, an ordinance of the Board of Directors of the San Diego County Water Authority establishing the Permanent Special Agricultural Water Rate Program and setting the policies and procedure for administration of the Permanent Special Agricultural Water Rate Program, and are not subject to the provisions of this resolution. If the Permanent Special Agricultural Water Rate Program is terminated, the Board of Directors may allocate water for agriculture according to the methodology provided in the Water Shortage Contingency Plan.

Section 7. Reserved Discretion

The Water Authority Board of Directors reserves its discretion to amend any of the provisions of this resolution as changed circumstances warrant. Nothing in this resolution shall limit the discretion or powers of the Board of Directors under Water Code Section 350.

PASSED, APPROVED AND ADOPTED this ____ day of _____,
2021.

AYES:

NOES:

ABSTAIN:

ABSENT:

Gary Croucher
Chair

ATTEST:

Jerry Butkiewicz
Secretary

I, Melinda Nelson, Clerk of the Board of the San Diego County Water Authority, certify that the vote shown above is correct and this Resolution No. 2021-__ was duly adopted at the meeting of the Board of Directors on the date stated above.

Melinda Nelson
Clerk of the Board

Appendix E

Multi-Hazard Mitigation Plan for San Diego County, California

MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

SAN DIEGO COUNTY, CALIFORNIA



Participating Jurisdictions:

Carlsbad	National City
Chula Vista	Oceanside
Coronado	Poway
Del Mar	San Diego
El Cajon	San Marcos
Encinitas	Santee
Escondido	Solana Beach
Imperial Beach	Vista
La Mesa	County of San Diego
Lemon Grove	Alpine FPD
Rancho Santa Fe FPD	
Padre Dam MWD	



October 2017

Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)

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(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

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SECTION ONE

Introduction

INTRODUCTION

Across the United States, natural and manmade disasters have led to increasing levels of death, injury, property damage, and interruption of business and government services. The impact on families and individuals can be immense and damages to businesses can result in regional economic consequences. The time, money and effort to respond to and recover from these disasters divert public resources and attention from other important programs and problems. With four presidential disaster declarations, four gubernatorial proclamations and fifteen local proclamations of emergency since 1999 San Diego County, California recognizes the consequences of disasters and the need to reduce the impacts of natural and manmade hazards. The elected and appointed officials of the County also know that with careful selection, mitigation actions in the form of projects and programs can become long-term, cost effective means for reducing the impact of natural and manmade hazards.

This *Multi-Hazard Mitigation Plan for San Diego County, California* (the Plan), was prepared with input from county residents, responsible officials, the San Diego County Water Authority, the Alpine and Rancho Santa Fe Fire Protection Districts, the Padre Dam Municipal Water District, the San Diego Foundation, ICLEI, the California Office of Emergency Services (Cal OES) and the Federal Emergency Management Agency (FEMA). The process to develop the Plan included over a year of coordination with representatives from all of the jurisdictions in the region. The Plan will guide the region toward greater disaster resilience in harmony with the character and needs of the community.

This section of the Plan includes an overview of the Plan, a discussion of the Plan's purpose and authority, and a description of the 18 incorporated cities and the unincorporated County within the San Diego region.

1.1 Plan Description/Purpose of Plan

Federal legislation has historically provided funding for disaster relief, recovery, and some hazard mitigation planning. The Disaster Mitigation Act of 2000 (DMA 2000) is the latest legislation to improve this planning process (Public Law 106-390). The new legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur. As such, DMA 2000 establishes a pre-disaster hazard mitigation program and new requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at the state and local levels. It identifies new requirements that allow HMGP funds to be used for planning activities, and increases the amount of HMGP funds available to states that have developed a comprehensive, enhanced mitigation plan prior to a disaster. States and communities must have an approved mitigation plan in place prior to receiving post-disaster HMGP funds. Local and tribal mitigation plans must demonstrate that their proposed mitigation measures are based on a sound planning process that accounts for the risk to and the capabilities of the individual communities.

State governments have certain responsibilities for implementing Section 322, including:

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- Preparing and submitting a standard or enhanced state mitigation plan;
- Reviewing and updating the state mitigation plan every three years;
- Providing technical assistance and training to local governments to assist them in applying for HMGP grants and in developing local mitigation plans; and
- Reviewing and approving local plans if the state is designated a managing state and has an approved enhanced plan.

The intent of DMA 2000 is to facilitate cooperation between state and local authorities, prompting them to work together. It encourages and rewards local and state pre-disaster planning and promotes sustainability as a strategy for disaster resilience. This enhanced planning network is intended to enable local and state governments to articulate accurate needs for mitigation, resulting in faster allocation of funding and more effective risk reduction projects.

FEMA prepared an Interim Final Rule, published in the Federal Register on February 26, 2002 (44 CFR Parts 201 and 206), which establishes planning and funding criteria for states and local communities.

The Plan has been prepared to meet FEMA requirements thus making the County and all participating jurisdictions and special districts eligible for funding and technical assistance from state and federal hazard mitigation programs.

1.2 Plan Purpose and Authority

In the early 1960s, the incorporated cities and the County of San Diego formed a Joint Powers Agreement which established the Unified San Diego County Emergency Services Organization (USDCEO) and the Unified Disaster Council (UDC) as the policy making group. The UDC, the San Diego County Board of Supervisors, City Councils and governing Boards for each participating municipality or special district will adopt the Plan once the State of California and FEMA have granted provisional approval. This Plan is intended to serve many purposes, including:

Enhance Public Awareness and Understanding – to help residents of the County better understand the natural and manmade hazards that threaten public health, safety, and welfare; economic vitality; and the operational capability of important institutions;

Create a Decision Tool for Management – to provide information that managers and leaders of local government, business and industry, community associations, and other key institutions and organizations need to take action to address vulnerabilities to future disasters;

Promote Compliance with State and Federal Program Requirements – to ensure that San Diego County and its incorporated cities can take full advantage of state and federal grant programs, policies, and regulations that encourage or mandate that local governments develop comprehensive hazard mitigation plans;

Enhance Local Policies for Hazard Mitigation Capability – to provide the policy basis for mitigation actions that should be promulgated by participating jurisdictions to create a more disaster-resistant future; and

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Provide *Inter-Jurisdictional Coordination of Mitigation-Related Programming* – to ensure that proposals for mitigation initiatives are reviewed and coordinated among the participating jurisdictions within the County.

Achieve *Regulatory Compliance* – To qualify for certain forms of federal aid for pre- and post-disaster funding, local jurisdictions must comply with the federal DMA 2000 and its implementing regulations (44 CFR Section 201.6). DMA 2000 intends for hazard mitigation plans to remain relevant and current. Therefore, it requires that State hazard mitigation plans are updated every three years and local plans, including the San Diego Regional Plan, every five years. This means that the Multi-jurisdictional Hazard Mitigation Plan for San Diego uses a “five-year planning horizon”. It is designed to carry the region through the next five years, after which its assumptions, goals, and objectives will be revisited and the plan resubmitted for approval.

1.3 Community Description

1.3.1 The County of San Diego

San Diego County, one of 58 counties in the State of California, was established on February 18, 1850, just after California became the 31st state. The County stretches 65 miles from north to south, and 86 miles from east to west, covering 4,261 square miles. Elevation ranges from sea level to about 6,500 feet. Orange and Riverside Counties border it to the north, the agricultural communities of Imperial County to the east, the Pacific Ocean to the west, and the State of Baja California, Mexico to the south. Geographically, the County is on the same approximate latitude as Dallas, Texas and Charleston, South Carolina.

San Diego County is comprised of 18 incorporated cities and 17 unincorporated communities. The county's total population in 2016 was approximately 3.2 million with a median age of 35 years (US 2010 Census Quickfacts). San Diego is the third most populous county in the state.

The following subsections provide an overview of the *Economy*, *Physical Features*, *Infrastructure*, and *Jurisdictional Summaries* for the County of San Diego.

1.3.1.1 Economy

San Diego offers a vibrant and diverse economy along with a strong and committed public/private partnership of local government and businesses dedicated to the creation and retention of quality jobs for its residents. Although slowed by the recession in 2008, the business climate continues to thrive due to the diversification of valuable assets such as world class research institutions; proximity to Mexico and the Pacific Rim; a well educated, highly productive work force; and an unmatched entrepreneurial spirit.

According to the [U.S. Bureau of Economic Analysis \(BEA\)](#), San Diego's Gross Regional Product (GRP)—an estimate of the total output of goods and services in the county—was \$197.9 billion in 2013 San Diego's abundant and diverse supply of labor at competitive rates is one of the area's greatest assets. As of November 2014, the total civilian labor force was estimated at 1.33 million, which includes self-employed individuals and wage and salary employment. Unemployment for

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November 2014 was 5.8% or 94,000 persons. This was slightly higher than the national rate of 5.5% but significantly lower than the state's rate of 7.1% (Source: [State of California Employment Development Department](#)).

There are several reasons for the strong labor supply in San Diego. The area's appealing climate and renowned quality of life are two main factors that attract a quality workforce. The excellent quality of life continues to be an important advantage for San Diego companies in attracting and retaining workers. In addition, local colleges and universities augment the region's steady influx of qualified labor. Each year San Diego's educational institutions graduate approximately 1,500 students with bachelors, masters and PhD degrees in electrical engineering, computer science, information systems, mechanical engineering and electronic technology. Over 2,500 students annually receive advanced degrees in business administration. There is also a pool of qualified workers from San Diego's business schools, which annually graduate over 1,000 students with administrative and data processing skills.

1.3.1.2 Employment

San Diego's diverse and thriving high-tech industry has become the fastest growing sector of employment and a large driving force behind the region's continued economic prosperity. San Diego's high-tech industry comprises over a tenth of the region's total economic output.

San Diego boasts the third largest concentration of biotech companies in the country with an estimated 700 firms. Currently there are over 34,500 people employed in San Diego's biotech industry. Life Science activity accounts for more than \$14.2 billion in direct economic activity and \$36.6 billion in total economic impact in San Diego (Source: BIOCOM 2013 Southern California Economic Impact Report). The general services industry is the second largest employment sector in the County, totaling nearly 51% of the county's industry employment. This sector includes business services, San Diego's tourism industry, health services and various business services, employing 671,600 workers. Government is the fourth largest employer with 236,200 jobs accounting for about 187% of total industry employment. (Source: [California Employment Development Division](#)).

1.3.1.3 Physical Features

The physical, social and economic development of the region has been influenced by its unique geography, which encompasses over 70 miles of coastline, broad valleys, lakes, forested mountains and the desert. The county can be divided into three basic geographic areas, all generally running in the north-south direction. The coastal plain extends from the ocean to inland areas for 20 to 25 miles. The foothills and mountains, rising in elevation to 6,500 feet, comprise the middle section of the county. The third area is the desert, extending from the mountains into Imperial County, 80 miles east of the coast. San Diegans can live in the mountains, work near the ocean, and take recreational day trips to the desert.

One of San Diego's greatest assets is its climate. With an average yearly temperature of 70 degrees, the local climate has mild winters, pleasant summers, and an abundance of sunshine and light rainfall.

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San Diego County experiences climatic diversity due to its varied topography. Traveling inland, temperatures tend to be warmer in the summer and cooler in the winter. In the local mountains, the average daily highs are 77 degrees and lows are about 45 degrees. The mountains get a light snowfall several times a year. East of the mountains is the Anza Borrego Desert, where rainfall is minimal and the summers are hot. The dry, mild climate of San Diego County is conducive to productivity. Outdoor work and recreational activities are possible almost all year-round. In addition, storage and indoor work can be handled with minimum investment in heating and air conditioning, although extreme heat events have increased slightly in both frequency and severity.

1.3.1.4 Infrastructure

San Diego has a well-developed highway system. There are about 610 miles of state highways and 1,000 miles of regional arterials within the San Diego region. The county also encompasses more than 7,185 miles of maintained city streets and county roads. Roughly 11.6 million vehicle trips are made on the region's roadways daily, accounting for more than 68 million vehicle miles traveled daily.

Since 1980, San Diego's licensed drivers have increased 46%; likewise, auto registrations have increased 57%. Vehicle miles of travel (VMT) are up 86% since 1980. Unfortunately the increase in drivers, vehicles and VMT has not been matched by corresponding increases in freeway mileage (10%) or local street and road mileage (19%). Over the same time period, there has been a decrease in both reported fatal accidents and injury accidents.

All urbanized areas in the region and some rural areas are served by public transit. The San Diego Region is divided into two transit development boards: the San Diego Metropolitan Transit Development Board (MTDB), and the North County Transit Development Board (NCTD). San Diego Transit Corporation (SDTC), which operates transit service under MTDB, serves about two million people annually with routes that cover the cities of San Diego, Chula Vista, El Cajon, La Mesa and National City, as well as portions of San Diego County's unincorporated areas. SDTC routes also connect with other regional operators' routes. San Diego Trolley operates the light rail transit system under MTDB. The North County Transit District (NCTD) buses carry passengers in north San Diego County, including Del Mar, east to Escondido, north to Orange County and Riverside County, and north to Camp Pendleton. NCTD's bus fleet carries more than 11 million passengers every year. NCTD's bus system has 35 routes. In addition, NCTD runs special Express Buses for certain sporting and special events in San Diego.

San Diego Gas & Electric is a public utility that provides natural gas and electric service to 3 million consumers through 1.2 million electric meters and 720,000 natural gas meters in San Diego and southern Orange counties. SDG&E's service area encompasses 4,100 square miles, covering two counties and 25 cities. SDG&E is a subsidiary of Sempra Energy, a Fortune 500 energy services holding company based in San Diego. Virtually all of the petroleum products in the region are delivered via a pipeline system operated by Kinder Morgan Energy Partners.

The San Diego County Water Authority is a public agency serving the San Diego region as a wholesale supplier of water. The Water Authority works through its 24 member agencies to provide a safe, reliable water supply to support the region's \$171 billion economy and the quality

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of life of 3 million residents or 90 percent of the county's population. The 24 member agencies are comprised of six cities, five water districts, three irrigation districts, eight municipal water districts, one public utility district and one federal agency (military base) and cover a service area of 920,000 acres. In 2008, Metropolitan Water District of Southern California supplied 71% of the water while 29% came from local and other supplies. Metropolitan imports the water from two sources, the Colorado River and the state Water Project (Bay-Delta) in northern California. Traveling hundreds of miles over aqueduct systems that include pump stations, treatment plants and reservoirs, approximately 700,000 acre-feet of water is transported annually through the Water Authority's five pipelines and then distributed to the member agencies for delivery to the public. Residents place the highest demand on water, consuming roughly 59% of all water in San Diego County. Industrial/commercial use is the second largest consumer of water at 17%, followed by the public sector at 13% and agriculture at 12% of the total water demand.

1.3.2 Local Jurisdictions

1.3.2.1 Carlsbad (Population: 110,972)

Carlsbad is a coastal community located 35 miles north of downtown San Diego. It is bordered by Encinitas to the south, Vista and San Marcos to the east and Oceanside to the north. Carlsbad is home to world-class resorts such as the La Costa Resort and Spa and the Four Seasons Resort at Aviara, offering championship-level golf and tennis facilities. The newest addition to Carlsbad's commercial/recreational landscape is Legoland, which opened in the spring of 1999. The city of Carlsbad has a strong economy, much of which has come from industrial development. Callaway Golf, Cobra Golf, ISIS Pharmaceuticals, Mallinckrodt Medical, NTN Communications and Immune Response are just a few of the local companies located in Carlsbad. The area has nine elementary schools, two junior high schools, and three high schools. The school district ranks among the best in the county. Distinguished private and parochial schools also serve Carlsbad, including the internationally renowned Army Navy Academy.

1.3.2.2 Chula Vista (Population: 256,780)

Chula Vista is home to an estimated 44% of all businesses in the South Bay Region of San Diego County. Chula Vista is the second largest municipality in San Diego County, and the 21st largest of 450 California cities. Today Chula Vista is attracting such companies as Solar Turbines and Raytheon, a \$20 billion global technology firm serving the defense industry. Chula Vista ranks among the nation's top ten governments in terms of employee productivity and local debt levels.

1.3.2.3 Coronado (Population: 23,500)

Coronado is a 13.5 square mile ocean village. The military bases of the Naval Air Station North Island and Naval Amphibious Base occupy 5.3 square miles. Coronado is connected to San Diego by a 2.3-mile bridge and to Imperial Beach (its neighbor to the south), by a six-mile scenic highway, the Silver Strand. It is primarily a bedroom community for San Diego executives, a haven for retired senior military officers and an internationally renowned tourist destination. This vibrant community welcomes more than two million visitors annually to soak up the sun and the sand while enjoying

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the lush surroundings and village appeal of Coronado. The city contains 14 hotels, amongst them are 3 world-class resorts including the Hotel Del Coronado and 67 highly acclaimed restaurants.

1.3.2.4 Del Mar (Population: 4,311)

Del Mar is the smallest city in the County with only 4,580 residents in the year 2014. Located 27 miles north of downtown San Diego, this coastal community is known for its affluence and comfortable standard of living. It is a beautiful wooded hillside area overlooking the ocean and has a resort-like atmosphere. The Del Mar Racetrack and Thoroughbred Club serve as Del Mar's most noted landmark. This racetrack is also the location for the annual San Diego County Fair. The City of Del Mar has 2.9 miles of shoreline that include the Del Mar City Beach and the Torrey Pines State Beach. There are two elementary schools, one junior high school and one high school in Del Mar, which is considered one of the region's best school districts.

1.3.2.5 El Cajon (Population: 102,211)

El Cajon is located 15 miles east of the City of San Diego. El Cajon is an inland valley surrounded by rolling hills and mountains. El Cajon's current population of 97,934 makes it the sixth most populated jurisdiction in the region. As one of the most eastern cities in the County, El Cajon has a warm and dry climate. El Cajon is a diverse residential, commercial, and industrial area, and serves as the main commerce center for several surrounding communities. Gillespie Field, a general aviation airport, is a major contributing factor to the city's vibrant industrial development. El Cajon includes a cross-section of housing types from lower cost mobile homes and apartments to moderately priced condominiums to higher cost single-family residences. There are 23 elementary schools, seven middle schools and four high schools.

1.3.2.6 Encinitas (Population: 61,588)

Encinitas is located along six miles of Pacific coastline in the northern half of San Diego County. Approximately 21 square miles, Encinitas is characterized by coastal beaches, cliffs, flat topped coastal areas, steep mesa bluffs and rolling hills. Incorporated in 1986, the City encompasses the communities of Old Encinitas, New Encinitas, Olivenhain, Leucadia and Cardiff-By-The-Sea. The Los Angeles/San Diego (LOSSAN) rail passes through the city, and other transit corridors traversing the city include El Camino Real and Coast Highway 101. Encinitas is bordered by Carlsbad to the north, Solana Beach to the south and the community of Rancho Santa Fe to the east.

1.3.2.7 Escondido (Population: 148,738)

Escondido has a reputation as a bedroom community due to the large percentage of residents who work outside of the city. Escondido is located 30 miles north of San Diego and is approximately 18 miles inland from the coast. It is the region's fifth most populated city. More than a decade ago, the people of Escondido conceived a vision of cultural excellence. Today, the \$73.4 million California Center for the Arts stands as a product of this vision. Escondido has 18 elementary schools, nine of which are parochial schools, three middle schools and six high schools, three of which are parochial. There is a unique mix of agriculture, industrial firms, high-tech firms, recreational centers and parks, as well as residential areas. The area's largest shopping mall, the

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North County Fair, houses 6 major retail stores and approximately 175 smaller stores. California State University, San Marcos and Palomar Community College are located within minutes of Escondido.

1.3.2.8 Imperial Beach (Population: 27,063)

Imperial Beach claims the distinction of being the "Most Southwesterly City - in the continental United States." The City is located in the Southwest corner of San Diego County, only five miles from the Mexican Border and 15 miles from downtown San Diego. With a population of 28,200, Imperial Beach occupies an area of 4.4 square miles. Imperial Beach offers some of the least expensive housing to be found west of the I-5. It is primarily a resort/recreation community with a vast beach area as well as a 12,000-foot pier for fishing. Some describe Imperial Beach as quaint, but mostly the town has a rare innocence and a relaxed atmosphere. Looking south just across the International border, Tijuana's famous "Bullring by the Sea," the Plaza De Monumental can be seen.

1.3.2.9 La Mesa (Population: 58,642)

La Mesa is centrally located 12 miles east of downtown San Diego. La Mesa is a suburban residential community as well as a commercial and trade center. The area is characterized by rolling hills and has a large number of hilltop home sites that take advantage of the beautiful views. La Mesa offers affordable housing within a wide range of prices, as well as high-end luxury homes atop Mt. Helix. La Mesa has an abundance of mixed-use condominiums for those who prefer a downtown village atmosphere. There is a positive balance between single-family housing and multi-family housing within La Mesa's city limits. One of the region's major retail facilities, Grossmont Center is located in the heart of the city adjacent to another major activity center, Grossmont Hospital. The La Mesa-Spring Valley Elementary School District provides 18 elementary schools and four junior high schools. There are two high schools in the area and Grossmont College, a two-year community college, is also located in La Mesa.

1.3.2.10 Lemon Grove Population: (26,141)

Lemon Grove lies eight miles east of downtown San Diego. Lemon Grove is the third smallest jurisdiction in the San Diego region based on population and geographic size. Initially the site of expansive lemon orchards, the city still remains a small town with a rural ambiance. Currently manufacturing and trade account for over one-third of the total employment in this area. A substantial proportion of the homes in Lemon Grove are single-family dwellings with the addition of several apartments and condominiums built over the last 20 years. There are five elementary schools and two junior high schools.

1.3.2.11 National City (Population: 59,578)

National City is one of the county's oldest incorporated areas. Just five miles south of San Diego, National City is the South Bay's center of industrial activity. The economy is based on manufacturing, shipbuilding and repair. The San Diego Naval Station, which overlaps San Diego and National City is the largest naval facility in the country. There are a great number of historical

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sites in National City and homes in the area are usually 50 years or older. Stately Victorians reflect the early part of the century when shipping and import/export magnates lived here. Served by National Elementary and Sweetwater High School districts, National City also offers several private schools for all grade levels. National City is best known for its Mile of Cars; the title describing its abundant auto dealerships. Two large shopping malls, Plaza Bonita and South Bay Plaza, are located in National City.

1.3.2.12 Oceanside (Population: 172,794)

Oceanside is centrally located between San Diego and Los Angeles. Located just 36 miles north of downtown San Diego, Oceanside is bordered by Camp Pendleton to the north, Carlsbad to the south, Vista to the east and the ocean to the west. The current population of 178,806 makes Oceanside the fourth largest jurisdiction in the County and the largest coastal community. Industrial real estate rates tend to be lower than the County average. There is an abundant supply of new housing and condominium developments, which tend to be more affordable than in other areas of Southern California coastal cities. With a near-perfect year-round climate and recognition as one of the most livable places in the nation, Oceanside offers both an incomparable lifestyle and abundant economic opportunity. Its extensive recreational facilities include 3.5 miles of sandy beaches, the Oceanside Harbor and the Oceanside Lagoon. There are 16 elementary schools, two parochial and two private, three middle schools and three high schools, as well as Mira Costa College and the United States International University.

1.3.2.13 Poway (Population: 49,417)

Poway is located 23 miles northeast of San Diego within the well-populated I-15 corridor. Poway is distinct because it is set into the foothills. Poway's main recreational facility is the 350-acre Lake Poway Park; the Lake also serves as a reservoir for the water supplied to San Diego by the Colorado River Aqueduct. The area has many recreational facilities, providing complete park sites, trails and fishing opportunities. Poway is also home to the Blue Sky Ecological Reserve, 700 acres of natural habitat with hiking, horseback riding and interpretive trails. The Poway Performing Arts Center is an 815 seat professional theater that began its eleventh season in 2001. The Poway Unified School District is excellent and has been consistently rated in the top tier. The district has four high schools, five middle schools and 19 elementary schools. There are eight private and parochial schools offering instruction from K-8 grades.

1.3.2.14 San Diego (Population 1,356,865)

The City of San Diego is the largest city in San Diego County, containing roughly half of the County's total population. With its current population of 1,336,865, the City of San Diego is the second largest city in the state. It is the region's economic hub, with well over half of the region's jobs and nearly three-quarters of the region's large employers. Thirteen of the region's 20 major colleges and universities are in the City of San Diego, as are six of the region's major retail centers. The City's visitor attractions are world-class and include Balboa Park, San Diego Zoo, Wild Animal Park, Sea World, Cabrillo National Monument and Old Town State Historic Park. The City of San Diego spans approximately 40 miles from its northern tip to the southern border. Including the

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shoreline around the bays and lagoons, the City of San Diego borders a majority of the region's shoreline, encompassing 93 of the region's 182 shoreline miles.

1.3.2.15 San Marcos (Population: 89,387)

San Marcos is located between Vista and Escondido, approximately 30 miles north of downtown San Diego. San Marcos is known for its resort climate, rural setting, central location and affordable housing prices. San Marcos has been the fastest growing jurisdiction in the region since 1956. It is home to two of the region's major educational facilities, Palomar Community College and California State University, San Marcos. The K-12 School District is an award winning district with over seven Schools of Distinction Awards to their credit.

1.3.2.16 Santee (Population: 56,105)

Santee lies 18 miles northeast of downtown San Diego and is bordered on the east and west by slopes and rugged mountains. The San Diego River runs through this community, which was once a dairy farming area. It is now a residential area that has experienced phenomenal growth since the 1970's. Since the expansion of the San Diego Trolley, Santee residents can ride the Trolley to Mission Valley, Downtown San Diego and as far as the U.S./Mexico Border. Elementary students attend one of 11 elementary schools, while high school students attend Santana or West Hills High School.

1.3.2.17 Solana Beach (Population: 13,236)

As one of the county's most attractive coastal communities, Solana Beach is known for its small-town atmosphere and pristine beaches. Incorporated in 1986, it has one of the highest median income levels in the County as well as an outstanding school system recognized with state and national awards of excellence. Lomas Santa Fe, located east of the freeway, is a master planned community, which features shopping, homes, and condominiums, two golf courses and the family oriented Lomas Santa Fe Country Club.

1.3.2.18 Vista (Population: 96,929)

Vista has been growing at twice the rate of the State of California and 50% faster than the rest of the San Diego area in the last decade. There are 10 elementary schools, four middle schools, and five high schools. More than 400 companies have located their businesses in the city since 1986.

1.3.2.19 Unincorporated County of San Diego (Population: 609,062)

The unincorporated County consists of approximately 34 Community Planning and Sub-regional Areas. Many of the communities in the Unincorporated County jurisdiction are located in the mountains, desert, North County, or on the border of Mexico. Rancho Santa Fe, an affluent residential and resort community, is one of the exceptions, located within the urban core area. The community of Julian is located in the central mountains along a principle travel route between the desert and Metropolitan San Diego, and is a common tourist destination. Alpine is located east of El Cajon on Interstate 8 and is considered a gateway to San Diego County's wilderness areas of mountains, forests, and deserts.

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The Sub-regional Planning Areas are Central Mountain, County Islands, Mountain Empire, North County Metro, and North Mountain. Communities within the Central Mountain Sub-region are Cuyamaca, Descanso, Guatay, Pine Valley, and Mount Laguna. The County Islands Community Plan area consists of Mira Mesa, Greenwood, and Lincoln Acres. The North Mountain Sub-region is mostly rural and includes Santa Ysabel, Warner Springs, Palomar Mountain, Mesa Grande, Sunshine Summit, Ranchita and Oak Grove. The Mountain Empire Sub-region contains Tecate, Potrero, Boulevard, Campo, Jacumba, and the remainder of the plan area. The Community Planning Areas are Alpine, Bonsall, Borrego Springs, Boulevard, Crest/Dehesa/Granite Hills/Harbison Canyon, Cuyamaca, Descanso, Desert, Fallbrook, Hidden Meadows, Jacumba, Jamul/Dulzura, Julian, Lake Morena/Campo, Lakeside/Pepper Drive-Bostonia, Otay, Pala-Pauma, Palomar/North Mountain, Pendleton/Deluz, Pine Valley, Portrero, Rainbow, Ramona, San Dieguito (Rancho Santa Fe), Spring Valley, Sweetwater, Tecate, Twin Oaks, Valle De Oro, and Valley Center.

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Multi-jurisdictional Participation Information

2.1 List of Participating and Non-Participating Jurisdictions

The incorporated cities that participated in the planning process are Carlsbad, Chula Vista, Coronado, Del Mar, El Cajon, Encinitas, Escondido, Imperial Beach, La Mesa, Lemon Grove, National City, Oceanside, Poway, San Diego (City), San Marcos, Santee, Solana Beach, Unincorporated (County), and Vista. There were no non-participating cities. The two Fire Protection District that participated in the revision of the plan were the Alpine Fire Protection District and the Rancho Santa Fe Fire Protection District. One municipal water district also participated, Padre Dam MWD. Representatives from all participating jurisdictions, local businesses, educational facilities, various public, private and non-profit agencies, and the general public provided input into the preparation of the Plan. Local jurisdictional representatives included but were not limited to fire chiefs/officials, police chiefs/officials, planners and other jurisdictional officials/staff.

2.2 Description of Each Jurisdiction's Participation in the Planning Process

A Hazard Mitigation Working Group (HMGW) was established to facilitate the development of the Plan. Representatives from each incorporated city, special district and the unincorporated county were designated by their jurisdiction as the HMGW member. Each HMGW member identified a Local Mitigation Planning Team for their jurisdiction that included decision-makers from police, fire, emergency services, community development/planning, transportation, economic development, public works and emergency response/services personnel, as appropriate. The jurisdiction-level Local Mitigation Planning Team assisted in identifying the specific hazards/risks that are of concern to each jurisdiction and to prioritize hazard mitigation measures. The HMGW members brought this information to HMGW meetings held regularly to provide jurisdiction-specific input to the multi-jurisdictional planning effort and to assure that all aspects of each jurisdiction's concerns were addressed. A list of the lead contacts for each participating jurisdiction is included in Section 3.2.

All HMGW members were provided an overview of hazard mitigation planning elements at the HMGW meetings. This training was designed after the FEMA State and Local Mitigation Planning How-to Guide worksheets, which led the HMGW members through the process of defining the jurisdiction's assets, vulnerabilities, capabilities, goals and objectives, and action items. The HMGW members were also given additional action items at each meeting to be completed by their Local Mitigation Planning Team. HMGW members also participated in the public workshops held to present the risk assessment, preliminary goals, objectives and actions. In addition, several HMGW members met with OES staff specifically to discuss hazard-related goals, objectives and actions. Preliminary goals, objectives and actions developed by jurisdiction staff were then reviewed with their respective City Council, City Manager and/or representatives for approval.

Throughout the planning process, the HMGW members were given maps of the profiled hazards as well as detailed jurisdiction-level maps that illustrated the profiled hazards and critical infrastructure. These maps were created using the data sources listed in Appendix B. These data sources contain the most recent data available for the San Diego region. A very large portion of this data was supplied by the regional GIS agency, SanGIS. The SanGIS data is updated periodically with the new data being provided by the local agencies and jurisdictions. This ensured that the data used was the most recent available for each participating jurisdiction. The HMGW members reviewed these maps and provided updates or changes to the critical facility or hazard layers. Data received from HMGW members were added to the hazard

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Multi-jurisdictional Participation Information

database and used in the modeling process described in the Risk Assessment portion of the Plan (Section 4). The data used in this revision of the plan is considered to be more accurate than that utilized in the original plan

All 18 incorporated cities and participating special districts provided OES with edits to critical facilities within their jurisdictions.

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3.1 Description of Planning Committee Formation

The San Diego County Operational Area consists of the County of San Diego and the eighteen incorporated cities located within the county's borders. Planning for emergencies, training and exercises are all conducted on a regional basis. In 1961 the County and the cities formed a Joint Powers Agency (JPA) to facilitate regional planning, training, exercises and responses. This JPA is known as the Unified San Diego County Emergency Services Organization (USDCEO). Its governing body is the Unified Disaster Council (UDC). The membership of the UDC is defined in the JPA. Each city and the County have one representative. Representatives from the cities can be an elected official, the City Manager or from the municipal law enforcement or fire agency. The County is represented by the Chairperson of the County Board of Supervisors, who also serves as Chair of the UDC.

In addition there are 26 fire protection districts and 17 water districts within the San Diego Region. Each was offered the opportunity to participate in the development of this plan.

3.1.1 Invitation to Participate

The original development of the Hazard Mitigation Plan, as well as this current revision, was conducted under the auspices of the UDC. At the direction of the UDC, the San Diego County Office of Emergency Services (OES) acted as the lead agency in the revision of this plan. Thomas Amabile, the representative for the San Diego County OES, requested input from each jurisdiction in the county. Each municipality and special district was formally invited to attend a meeting to develop an approach to the planning process and to form the HMWG Committee (See Appendix A). These invitations were in the form of an email to each member jurisdiction. Invitations were also emailed to each Water District and Fire Protection District within the County. At the October 17, 2013 UDC meeting, it was again announced that the plan was reaching the five year mark and required updating. Each jurisdiction also confirmed their participation on the HMWG. In addition to the eighteen incorporated cities, OES provided an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as business, academia and other private and non-profit interested to be involved in the planning process. Some of those parties are listed in Section 3.2 below. The committee was formed as a working group to undertake the planning process and meeting dates were set for all members of the committee and interested parties to attend. Local jurisdictional representatives included but were not limited to fire chiefs/officials, police chiefs/officials, planners and other jurisdictional officials/staff.

3.2 Name of Planning Committee and its Members

The HMWG is comprised of representatives from San Diego County (County), each of the 18 incorporated cities in the County four special districts and interested public agencies and citizens, as listed above in Section 2.1. The HMWG met regularly, and served as a forum for participating agencies to voice their opinions and concerns about the mitigation plan. Although several jurisdictions sent several representatives to the HMWG meetings, each jurisdiction selected a lead representative who acted as the liaison between their jurisdictional Local Mitigation Planning Team and the HMWG. Each local team, made up of other jurisdictional staff/officials met separately and provided additional local-level input to the leads for inclusion into the Plan. These lead representatives are:

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Lead HMWG Representatives for Participating Jurisdictions:

- City of Carlsbad, David Harrison, Fire Department, Emergency Preparedness Manager
- City of Chula Vista, Marisa Balmer, Fire Department, Emergency Services Coordinator
- City of Coronado, Perry Peake, Fire Department, Battalion Chief
- City of Del Mar, Ashlee Stratakis, Fire Department, Program Analyst
- City of El Cajon, Rick Sitta, Fire Department, Deputy Chief
- City of Encinitas, Tom Gallup, Fire Department, Senior Program Analyst
- City of Escondido, Don Rawson, Fire Department, Emergency/Disaster Preparedness Manager
- City of Imperial Beach, Dean Roberts, Fire Department, Emergency Services Coordinator
- City of La Mesa, Greg McAlpine, Fire Dept, Deputy Chief
- City of Lemon Grove, Tim Smith, Fire Department, Deputy Chief
- City of National City, Walter Amadee, Fire Department, Management Analyst III
- City of Oceanside, Greg Vanvorhees, Fire Department, Fire Marshall
- City of Poway, Dane Cawthone, Fire Department, Division Chief
- City of San Diego, Jeff Pack, Office of Homeland Security, Sr. Homeland Security Coordinator
- City of San Diego, Eugene Ruzzini, Office of Homeland Security, Analyst
- City of San Marcos, Scott Hansen, Fire Department, Battalion Chief
- City of Santee, Richard Mattick, Fire Department, Assistant Chief
- City of Solana Beach, Ashlee Stratakis, Fire Department, Program Analyst
- City of Vista, Mike Easterling, Fire Department, Deputy Chief
- County of San Diego, Thomas Amabile, OES, Sr. Emergency Services Coordinator
- County of San Diego, Jason Batchelor, SD County Planning and Developmental Services, GIS Coordinator
- Alpine FPD, Bill Paskle, Fire Chief
- Padre Dam MWD, Larry Costello, Safety and Risk Manager
- Rancho Santa Fe FPD, Tony Michel, Fire Chief

Representatives of the following agencies/organizations were invited to attend all planning team meetings and provided both data and general input to and feedback on the plan:

- California Office of Emergency Services (Cal OES.), Joanne Phillips, Sr. Emergency Services Coordinator
- Emergency Preparedness and Disaster Medical Response, Donna Johnson, EMS Specialist
- San Diego County Hazardous Materials Division, Dave Cammall, Registered Environmental Health Specialist
- San Diego Department of Public Works, Gitanjali Shinde, Assistant Engineer

The California Office of Emergency Services participated on the regional planning committee. The representatives from San Diego County EMS, Hazardous Materials and Public Works participated on the County's local planning team.

Each participating jurisdiction had their own local planning team. Details on the membership of those teams can be found in the individual jurisdiction's portion of Section Five. Each local planning team met

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either before or after the regional team to discuss the topics of the regional meetings (listed in Section 3.3 below).

Finally, the Unified Disaster Council (UDC) received briefings regularly on the progress of the planning process. UDC meetings are open to the public, with agendas and notices posted according to California's Brown Act, with emailed invitations and reminders sent out one to two weeks prior to the meetings. Included on that email list are representatives from the following agencies:

- American Red Cross
- Chambers of Commerce
- Federal Agencies (USN, USMC, USCG, DHS)
- Hospitals
- Port of San Diego
- State Agencies (Cal OES, DMV, Caltrans)
- School Districts
- Universities and colleges
- Utilities (Power- SDG&E, Water – San Diego County Water Authority and Water Districts, Cable, telephone and internet – Cox Communications)

3.3 Hazard Mitigation Working Group Meetings

The Hazard Mitigation Working Group met regularly. The following is a list of meeting dates and results of meetings (see Appendix A for sign-in sheets, meeting agendas, and meeting minutes).

HMWG Meeting Dates/Results of Meeting:

HMWG Meeting 1: 2/11/2014 - Kickoff and Formation of HMWG

Climate Change Workshop 1: 3/4/2014

HMWG Meeting 2: 3/11/2014 - Overview of Planning Process/Assessing Risks

Climate Change Workshop 2: 6/10/2014

HMWG Meeting 3: 6/10/2014 - Overview of Planning Process/Profiling Hazards

HMWG Meeting 4: 9/16/2014 - Review Risk Assessment/Development of Mitigation Plan

The distribution of the draft and final plans was accomplished electronically. Other meetings included individual meetings with jurisdictions and meetings with GIS staff.

Not all members were able to attend all meetings. Follow-up phone calls and in person meetings were conducted with those who were not able attend to ensure they were kept current on the process.

3.4 Planning Process Milestones

The approach taken by San Diego County relied on sound planning concepts and a methodical process to identify County vulnerabilities and to propose the mitigation actions necessary to avoid or reduce those vulnerabilities. Each step in the planning process was built upon the previous, providing a high level of assurance that the mitigation actions proposed by the participants and the priorities of implementation are valid. Specific milestones in the process included:

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Risk Assessment (June 2014 – September 2014) - The HMWG used the list of hazards from the current Multi-jurisdictional Hazard Mitigation Plan to determine if they were still applicable to the region and if there were any new threats identified that should be added to the plan. Specific geographic areas subject to the impacts of the identified hazards were mapped using a Geographic Information System (GIS). The HMWG had access to updated information and resources regarding hazard identification and risk estimation. This included hazard specific maps, such as floodplain delineation maps, earthquake shake potential maps, and wildfire threat maps; GIS-based analyses of hazard areas; the locations of infrastructure, critical facilities, and other properties located within each jurisdiction and participating special district; and an estimate of potential losses or exposure to losses from each hazard.

The HMWG also conducted a methodical, qualitative examination of the vulnerability of important facilities, systems, and neighborhoods to the impacts of future disasters. GIS data and modeling results were used to identify specific vulnerabilities that could be addressed by specific mitigation actions. The HMWG also reviewed the history of disasters in the County and assessed the need for specific mitigation actions based on the type and location of damage caused by past events. The process used during the completion of the initial plan and first update was utilized for this update.

Finally, the assessment of community vulnerabilities included a review of current codes, plans, policies, programs, and regulations used by local jurisdictions to determine whether existing provisions and requirements adequately address the hazards that pose the greatest risk to the community. Again, this was a similar process to that used in the original plan and first update.

Goals, Objectives and Alternative Mitigation Actions (August, 2014- October, 2014) – Based on this understanding of the hazards faced by the County, the goals and objectives identified in the current plan were reviewed to see what had been completed and could be removed and which were not able to be completed due to funding or other roadblocks. Members then added those goals, objectives or actions as required for the completion of the update. This was done by the members working with their local planning groups and in a series of one-on-one meetings with OES staff.

Mitigation Plan and Implementation Strategy (October 2014 - February, 2015) – Each jurisdiction reviewed their priorities for action from among their goals, objectives and actions, developing a specific implementation strategy including details about the organizations responsible for carrying out the actions, their estimated cost, possible funding sources, and timelines for implementation.

Work Group Meetings (February, 2014 – December, 2014) - As listed in Section 3.3 a series of HMWG meetings were held in which the HMWG considered the probability of a hazard occurring in an area and its impact on public health and safety, property, the economy, and the environment, and the mitigation actions that would be necessary to minimize impacts from the identified hazards. These meetings were held every month or two (depending on the progress made) starting February 2014 and continued through September 2014. The meetings evolved as the planning process progressed, and were designed to aid the jurisdictions in completing worksheets that helped define hazards within their jurisdictions, their existing capabilities and mitigation goals and action items for the Mitigation Plan.

Climate Change Workshops and Stakeholder Meeting (March, 2014-September 2014) – A series of workshops to discuss the impact climate change is having on the regions natural hazards were conducted to educate local planners and community members. Topics discussed included sea level rise, drought, changes to precipitation patterns and extreme weather, as well as their current and potential future impacts. The information presented in these workshops were incorporated into the risk assessment process as well in the development of mitigation goals and objectives.

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3.5 Public Involvement

A detailed survey was posted on the websites of all participating jurisdictions. It was active from the beginning of March 2014 to the end of July 2014. There were 532 responses to the survey. The survey questions and respondents answers are found in Appendix D.

A Hazard Mitigation Plan Web Page, as part of the San Diego County Office of Emergency Services website was developed to provide the public with information. Items posted on the web site included the current plan, and draft updates, by jurisdiction or agency.

Public involvement was valuable in the development of the Plan. The areas of concern provided by the survey responses were used by each jurisdiction while developing mitigation objectives and actions.

3.6 Existing Plans or Studies Reviewed

HMWG team members and their corresponding Local Mitigation Planning Teams prior to and during the planning process reviewed several plans, studies, and guides. These plans included FEMA documents, emergency services documents as well as county and local general plans, community plans, local codes and ordinances, and other similar documents. These included:

San Diego County/Cities General Plans

Various Local Community Plans

Various Local Codes and Ordinances

FEMA Local Mitigation Handbook March 2013

FEMA Mitigation Ideas January 25, 2013

Integrating Hazard Mitigation and Climate Adaptation Planning – ICLEI February 2014

Climate Change Impacts in the United States – U.S. Government Printing Office 2014

Local Mitigation Plan Review Tool

California State Hazard Mitigation Plan 2013

Unified San Diego County Emergency Services Organization Operational Area Emergency Plan dated September 2010

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SECTIONFOUR

Risk Assessment

4.1 Overview of the Risk Assessment Process

Risk Assessment requires the collection and analysis of hazard-related data in order to enable local jurisdictions to identify and prioritize appropriate mitigation actions that will reduce losses from potential hazards. The FEMA Local Mitigation Handbook March 2013 identifies nine tasks to the hazard mitigation planning process, including: 1) determining the planning area and resources, which requires establishing the planning area and those jurisdictions to be included in the planning process 2) building the planning team, which involves identifying local team members, engaging local leadership, getting buy-in and documentation of the process, 3) creating an outreach strategy, to ensure public participation 4) reviewing community capabilities, which involves assessing what resources are in place, such as the National Flood Insurance Program, to help mitigate the hazards, 5) conducting the risk assessment which profiles the hazards, 6) developing a mitigation strategy to minimize the impacts of the hazards, 7) keeping the plan current, 8) reviewing and adopting the plan and 9) creating a safe and resilient community. Tasks 1, 2 3 and 4 were described in Section Three. The remaining tasks are described below.

When the revision process began in 2014 a complete review of the hazards identified in the original plan and first update was conducted to determine if they were still valid and should be kept as a target for mitigation measures or removed from the list. We also reassessed those hazards that were not considered for mitigation actions in 2010 to determine if that decision was still applicable or if they should be moved to the active list. Finally, we examined potential or emerging hazards, including climate change, to see if any should be included on the active list.

The data used was the most recent data available from SanGIS and the participating jurisdictions. This data changed the model results in some cases raising the risks and reducing it in others. The overall result was a more accurate picture of the risks facing the region. An example of this is the data for dam failure. The 2010 plan shows an exposed population of is 241,767, with the exposure for residential buildings at \$23,054,569. The 2014 data shows the exposed population has increased to 432,664, with exposure for residential buildings increasing to \$40,141,337.

While many of the mitigation measures listed in the original plan and revision were accomplished, the risk of the hazard did not significantly diminish. This is easily seen in both the wildfire and earthquake hazards. While mitigation measures have been put in place (such as the update of the fire code and vegetation management measures) wildfire remains, and will continue to be, the greatest risk to the San Diego region. The HMG reviewed all events since 2010 (wildfires, etc.) and all were profiled accurately in the original plan. The review of the other hazards showed that the updated data was consistent with previous growth in the region. Any significant changes to the hazard profiles were the result of the incorporation of climate change into this plan.

4.1.1 Risk Assessment

Risk Assessment is the process of identifying the potential impacts of hazards that threaten an area including both natural and man-made events. A natural event causes a hazard when it harms people or property. Such events would include floods, earthquakes, tornadoes, tsunamis, coastal storms, landslides, and wildfires that strike populated areas. Man-made hazard events are caused by human activity and include technological hazards and terrorism. Technological hazards are generally accidental and/or have unintended consequences (for example, an accidental hazardous materials release). Terrorism is defined by the *Code*

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of *Federal Regulations* as "...unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." Natural hazards that have harmed the County in the past are likely to happen in the future; consequently, the process of risk assessment includes determining whether or not the hazard has occurred previously. Approaches to collecting historical hazard data include researching newspapers and other records, conducting a planning document and report literature review in all relevant hazard subject areas, gathering hazard-related GIS data, and engaging in conversation with relevant experts from the community. In addition, a variety of sources were used to determine the full range of all potential hazards within San Diego County. Even though a particular hazard may not have occurred in recent history in San Diego County, it is important during the hazard identification stage to consider all hazards that may potentially affect the study area.

4.1.2 Profiling (Describing) Hazards

Hazard profiling entails describing the physical characteristics of hazards such as their magnitude, duration, past occurrences and probability. This stage of the hazard mitigation planning process involves creating base maps of the study area and then collecting and mapping hazard event profile information obtained from various federal, state, and local government agencies. Building upon the original hazard profiles, OES used the existing hazard data tables (created for the original Hazard Mitigation Plan and revision) and updated them using current data. The revised hazard data was mapped to determine the geographic extent of the hazards in each jurisdiction in the County. The level of risk associated with each hazard in each jurisdiction was also estimated and assigned a risk level of high, medium or low depending on several factors unique to that particular hazard. The hazards looked at were both natural and man-made.

Probability of future events are described in the plan as:

- Highly Likely – Occurs at intervals of 1 – 10 years
- Likely - Occurs at intervals of 10 - 50 years
- Somewhat Likely - Occurs at intervals greater than every 50 years

4.1.3 Identifying Assets

The next step of the risk assessment process entails identifying which assets in each jurisdiction will be affected by each hazard type. Assets include the built environment (any type of structure or critical facility such as hospitals, schools, museums, apartment buildings, and public infrastructure), people, economic factors, future development and the natural environment. The inventory of existing and proposed assets within the County was updated. The assets were then mapped to show their locations and to determine their vulnerability to each hazard type. The HMWG also considered proposed structures, including planned and approved developments, based upon a review of the General Plan Land Use Element for the County and the cities.

4.1.4 Analyze Risk

Analyzing risk involves evaluating vulnerable assets, describing potential impacts and estimating losses for each hazard. Vulnerability describes the degree to which an asset is susceptible to damage from a hazard. Vulnerability depends on an asset's construction, contents and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of

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another. Often, indirect effects can be much more widespread and damaging than direct effects. Risk analysis predicts the extent of injury and damage that may result from a hazard event of a given intensity in a given area. It identifies the effects of natural and man-made hazard events by estimating the relative exposure of existing and future population, land development, and infrastructure to hazardous conditions. The analysis helps set mitigation priorities by allowing local jurisdictions to focus attention on areas most likely to be damaged or most likely to require early emergency response during a hazard event.

4.1.5 Repetitive Loss

Disaster records were reviewed for repetitive losses. No repetitive losses were found for Coastal storms, erosion and Tsunamis, Dam Failures, Earthquakes, landslides, wildfire or liquefaction. The City of Lemon Grove had one address involved in a series of repetitive structure fires caused by arson. A list of repetitive losses by jurisdiction is below (Repetitive loss due to flooding is found in Section 4.3.5.3):

Alpine FPD	0	National City	0
Carlsbad	1 Structure Fire	Oceanside	0
Chula Vista	0	Poway	0
Coronado	0	Padre Dam MWD	0
Del Mar	3 Storm /Erosion	San Diego	0
El Cajon	0	San Marcos	0
Encinitas	0	Santee	0
Escondido	0	Solana Beach	0
Imperial Beach	0 Flood	Vista	0
La Mesa	0	County of San Diego	0 Flood
Lemon Grove	1 Structure Fire	Rancho Santa Fe FPD	0

4.1.6 Exposure Analysis

Exposure analysis identifies the existing and future assets located in an identified hazard area. It can quantify the number, type and value of structures, critical facilities, and infrastructure located in those areas, as well as assets exposed to multiple hazards. It can also be used to quantify the number of future structures and infrastructure possible in hazard prone areas based on zoning and building codes.

4.2 Hazard Identification and Screening

4.2.1 List of Hazards Prevalent in the Jurisdiction

The HMWG reviewed the hazards identified in the original Hazard Mitigation Plan and evaluated each to see if they still posed a risk to the region. In addition, the hazards listed in the How-to Guide were also reviewed to determine if they should be added to the list of hazards to include in the plan revision. All hazards identified by FEMA in the How-To-Guides were reviewed. They include: avalanche, coastal storm, coastal erosion, dam failure, drought/water supply, earthquake, expansive soils, extreme heat, flooding, hailstorm, house/building fire, land subsidence, landslide, liquefaction, severe winter storm, tornado, tsunami, wildfire, windstorm, and volcano. Although not required by the FEMA *Disaster Mitigation Act of 2000*, manmade hazards such as hazardous materials release, nuclear materials release, and terrorism were also reviewed by the HMWG.

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Climate change was not included as a hazard. However, the impact of climate change on the identified hazards was included in the evaluation of the hazards and their impacts.

4.2.2 Hazard Identification Process

As summarized above, hazard identification is the process of identifying all hazards that threaten an area, including both natural and man-made events. In the hazard identification stage, The HMWG determined hazards that potentially threaten San Diego County. The hazard screening process involved narrowing the all-inclusive list of hazards to those most threatening to the San Diego region. The screening effort required extensive input from a variety of HMWG members, including representatives from City governments, County agencies, special districts, fire agencies and law enforcement agencies, the California Office of Emergency Services, local businesses, community groups, the 2010 Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, and the general public.

OES, with assistance of GIS experts from the County of San Diego's Planning and Development Services used information from FEMA and other nationally and locally available databases to map the County's hazards, infrastructure, critical facilities, and land uses. This mapping effort was utilized in the hazard screening process to determine which hazards would present the greatest risk to the County of San Diego and to each jurisdiction within the County.

It was also determined that the coastal storm, erosion, and tsunami hazards should be profiled together because the same communities in the County have the potential to be affected by all three hazards. In the development of the initial plan, the HMWG indicated that based on the fact that the majority of the development in San Diego is relatively recent (within the last 60 years), an urban type of fire that destroys multiple city blocks is not likely to occur alone, without a wildfire in the urban/wild-land interface occurring first. Therefore, it was determined that house/building fire and wildfire should be addressed as one hazard category in the plan. This current revised plan continues to discuss structure fire and wildfire together. Similarly, the original plan and first revision addressed earthquake and liquefaction as one category because liquefaction does not occur unless an adequate level of ground shaking from an earthquake occurs first. With the decommissioning of the San Onofre Nuclear Generating Station it was decided to incorporate nuclear materials release (resulting from an accident) under hazardous materials release.

The final list of hazards to be profiled for San Diego County was determined as Wildfire/Structure Fire, Flood, Coastal Storms/Erosion/Tsunami, Earthquake/Liquefaction, Rain-Induced Landslide, Dam Failure, Drought, Hazardous Materials Incidents, and Terrorism.

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Table 4.2-1 shows a summary of the hazard identification results for San Diego County.

Table 4.2-1
Summary of Hazard Identification Results

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
Coastal Storms, Erosion and Tsunami	<ul style="list-style-type: none"> Historical Coastlines (NOAA) Shoreline Erosion Assessment (SANDAG) Maximum Tsunami Run up Projections (USCA OES) FEMA FIRM Maps FEMA Hazards website Coastal Zone Boundary (CALTRANS) Tsunamis and their Occurrence along the San Diego County Coast (report, Westinghouse Ocean Research Laboratory) Tsunami (article, Scientific American) Storms in San Diego County (publication of San Diego County Dept. of Sanitation and Flood Control) 	<ul style="list-style-type: none"> Coastal storms prompted 11 Proclaimed States of Emergency from 1950-2017 Coastline stabilization measures have been implemented at various times in the past (erosion) Extensive development along the coast
Dam Failure	<ul style="list-style-type: none"> FEMA-HAZUS Dam Inundation Data (SanGIS) San Diego County Water Authority (SDCWA) (Olivenhain Dam) FEMA FIRM maps Topography (SANDAG) FEMA Hazards website 	<ul style="list-style-type: none"> Dam failure 58 dams exist throughout San Diego County Many dams over 30 years old Increased downstream development
Drought	<ul style="list-style-type: none"> California Department of Water Resources San Diego County Water Authority 	<ul style="list-style-type: none"> Statewide multiple year droughts have occurred numerous times since 1976 Regional water storage reserves are at the lowest point since 2008
Earthquake	<ul style="list-style-type: none"> USGS CGS URS CISN SanGIS SANDAG FEMA-HAZUS 99 FEMA Hazards website 	<ul style="list-style-type: none"> Several active fault zones pass through San Diego County

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Hazard	Data Collected for Hazard Identification	Justification for Inclusion
Floods	<ul style="list-style-type: none"> FEMA FIRM Maps Topography Base flood elevations (FEMA) Historical flood records San Diego County Water Authority San Diego County Dept. of Sanitation and Flood Control FEMA Hazards website 	<ul style="list-style-type: none"> Much of San Diego County is located within the 100-year floodplain Flash floods and other flood events occur regularly during rainstorms due to terrain and hydrology of San Diego County There have been multiple Proclaimed States of Emergency between 1950-2016 for floods in San Diego County
Hazardous Materials Release	<ul style="list-style-type: none"> County of San Diego Dept. of Environmental Health, Hazardous Materials Division 	<ul style="list-style-type: none"> San Diego County has several facilities that handle or process hazardous materials Heightened security concerns since September 2001
Landslide	<ul style="list-style-type: none"> USGS CGS Tan Map Series Steep slope data (SANDAG) Soil Series Data (SANDAG) FEMA-HAZUS FEMA Hazards website NEH 	<ul style="list-style-type: none"> Steep slopes within earthquake zones characterize San Diego County, which creates landslide risk. There have been 2 Proclaimed States of Emergency for landslides in San Diego County
Liquefaction	<ul style="list-style-type: none"> Soil-Slip Susceptibility (USGS) FEMA-HAZUS MH FEMA Hazards website 	<ul style="list-style-type: none"> Steep slopes or alluvial deposit soils in low-lying areas are susceptible to liquefaction during earthquakes or heavy rains. San Diego County terrain has both of these characteristics and lies within several active earthquake zones
Nuclear Materials Release	<ul style="list-style-type: none"> San Onofre Nuclear Generating Station (SONGS) and Department of Defense 	<ul style="list-style-type: none"> The potential exists for an accidental release to occur at San Onofre or from nuclear ships in San Diego Bay Heightened security concerns since September 2001
Terrorism	<ul style="list-style-type: none"> County of San Diego Environmental Health Department Hazardous Materials Division 	<ul style="list-style-type: none"> The federal and state governments have advised every jurisdiction to consider the terrorism hazard Heightened security concerns since September 2001
Wildfire/ Structure Fire	<ul style="list-style-type: none"> CDF-FRAP USFS CDFG Topography Local Fire Agencies Historical fire records FEMA Hazards website 	<ul style="list-style-type: none"> San Diego County experiences wildfires on a regular basis 9 States of Emergency were declared for wildfires between 1950-2016 Terrain and climate of San Diego Santa Ana Winds

A matrix of all data collected, including source, original projection, scale and data limitations is included in Attachment B. Maps were generated depicting the potential hazards throughout the county and distributed to the jurisdictions. Data and methods that were ultimately used to determine risk levels and probability of occurrence for each hazard are described in detail in the hazard profiling sections.

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Hazards are categorized in this plan as being highly likely (occurring every 1-10 years), likely (occurring every 10-50 years) or somewhat likely (occurring at intervals greater than 50 years).

4.2.3 Hazard Identification Sources

Once the hazards of concern for San Diego County were determined, the available data was collected, using sources including the Internet, direct communication with various agencies, discussions with in-house URS experts, and historical records. Specific sources included the United States Geological Survey (USGS), California Geological Survey (CGS), Federal Emergency Management Agency (FEMA) HAZUS, FEMA Flood Insurance Rate Maps (FIRM), United States Forest Service (USFS), California Department of Forestry – Fire and Resource Assessment Program (CDF-FRAP), National Oceanographic and Atmospheric Administration (NOAA), San Diego Geographic Information Source (SanGIS), San Diego Association of Governments (SANDAG), San Diego County Flood Control District, Southern California Earthquake Data Center (SCEDC), California Seismic Safety Commission (CSSC), California Integrated Seismic Network (CISN), California Department of Fish and Game (CDFG), Drought Outlook websites, and input gathered from local jurisdictions districts and agencies. When necessary, agencies were contacted to ensure the most updated data was obtained and used. Historical landmark locations throughout the County were obtained from the National Register and from the San Diego Historical Resources Board.

Table 4.2-1 also depicts data sources researched and utilized by hazard, as well as brief justifications for inclusion of each hazard of concern in the San Diego region. See Appendix B for a Data Matrix of all sources used to gather initial hazard information.

4.2.4 Non-Profiled Hazards

During the initial evaluation the HMWG determined that those hazards that were not included in the original plan's profiling step because they were not prevalent hazards within the County, were found to pose only minor or very minor threats to the County compared to the other hazards had not changed and would not be included in the revision. The following table gives a brief description of those hazards and the reason for their exclusion from the list.

Table 4.2-2
Summary of Hazards Excluded from Hazard Profiling

Hazard	Description	Reason for Exclusion
Avalanche	A mass of snow moving down a slope. There are two basic elements to a slide; a steep, snow-covered slope and a trigger	Snowfall in County mountains not significant; poses very minor threat compared to other hazards
Expansive soils	Expansive soils shrink when dry and swell when wet. This movement can exert enough pressure to crack sidewalks, driveways, basement floors, pipelines and even foundations	Presents a minor threat to limited portions of the County
Hailstorm	Can occur during thunderstorms that bring heavy rains, strong winds, hail, lightning and tornadoes	Occurs during severe thunderstorms; most likely to occur in the central and southern states; no historical record of this hazard in the region.
Land subsidence	Occurs when large amounts of ground water have been withdrawn from certain types of	Soils in the County are mostly granitic. Presents a minor threat to limited parts of the county. No historical record

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Hazard	Description	Reason for Exclusion
	rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rocks fall in on themselves.	of this hazard in the region.
Tornado	A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes as a result of a hurricane) and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado is a result of the high wind velocity and wind-blown debris.	Less than one tornado event occurs in the entire State of California in any given year; poses very minor threat compared to other hazards. No historical record of this hazard in the region.
Volcano	A volcano is a mountain that is built up by an accumulation of lava, ash flows, and airborne ash and dust. When pressure from gases and the molten rock within the volcano becomes strong enough to cause an explosion, eruptions occur	No active volcanoes in San Diego County. No historical record of this hazard in the region.
Windstorm	A storm with winds that have reached a constant speed of 74 miles per hour or more	Maximum sustained wind speed recorded in the region is less than 60 miles per hour and would not be expected to cause major damage or injury (see Figure 4.3.1)

4.3 Hazard Profiles

A hazard profile is a description of the physical characteristics of a hazard and a determination of various hazard descriptors, including magnitude, duration, frequency, probability, and extent. The hazard data that were collected in the hazard identification process were mapped to determine the geographic extent of the hazards in each jurisdiction in the County and the level of risk associated with each hazard. Most hazards were given a risk level of high, medium or low depending on several factors unique to the hazard. The hazards identified and profiled for San Diego County, as well as the data used to profile each hazard are presented in this section. The hazards are presented in alphabetical order; and this does not signify level of importance to the HMWG. Because Nuclear Materials Release, Hazardous Materials Release and Terrorism hazards are sensitive issues and release of information could pose further unnecessary threat, the HMWG decided that each of these hazards would be discussed separately in a “For Official Use Only” Appendix and would be exempt from public distribution and disclosure by Section 6254 (99) of the California Government Code (See separately bound Attachment A).

4.3.1 Emerging Risk – Climate Change

According to the Intergovernmental Panel on Climate Change (IPCC), warming of the climate system is unequivocal, as is now evident from observations of increased global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level.¹ The overwhelming majority of

¹ IPCC, 2013: Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

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climate scientists agree that human activities, especially burning of fossil fuels, are responsible for most of the global warming observed.²

Climate change is already affecting California and the San Diego region. Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century.³ Flooding and erosion in coastal areas is already occurring even at existing sea levels and damaging some coastal areas during storms and extreme high tides.⁴ California has also seen an increase in average temperatures of about 1.5F since 1985, more extreme heat events, and decreasing spring snowmelt from the Sierra Nevada as more precipitation falls as rain instead of snow.⁵ Eighty-four percent of San Diego County residents believe that climate change is happening.⁶

The climate is projected to continue to change over this century and beyond.⁷ Climate change is not a hazard in and of itself, but rather is a factor that could affect the location, extent, probability of occurrence, and magnitude of climate-related hazards. This risk assessment goes on to discuss climate change as a factor affecting extreme heat, coastal storms/erosion, wildfire, flooding, and drought/water supply. The climate change factor is increasing risk for some natural hazards, and this assessment includes information about how risk will change into the future. By assessing ongoing changes in risk—in addition to the traditional practice of risk assessment based on observed hazard events—this plan's hazard mitigation strategies can better reduce risk from hazards expected going forward. The following section provides a summary of projections for temperatures, sea level rise, and precipitation, provided by Dr. Daniel Cayan and his team at Scripps Institution of Oceanography.⁸

4.3.1.1 Annual Average Temperature

According to the National Climate Assessment, the Southwestern United States has already heated up markedly. The period since 1950 has been hotter than any other comparably long period in the last 600 years and the decade from 2000 to 2010 was the hottest in the 110-year instrumental record.⁹ Global climate

² Ibid.

³ California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2013. "Indicators of Climate Change in California."

⁴ Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Ch. 2: Our Changing Climate. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT.

⁵ Ibid.

⁶ Climate Education Partners, 2014. "San Diego, 2050 Is Calling. How Will We Answer?"

⁷ Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville, 2014: Ch. 2: Our Changing Climate. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 19-67. doi:10.7930/J0KW5CXT.

⁸ Higbee, Melissa, Daniel Cayan, Sam Iacobellis, Mary Tyree (2014). Report from San Diego Hazard Mitigation Plan Update Training Workshop #1: Climate Change and Hazards in San Diego. ICLEI-Local Governments for Sustainability. Accessed July 7, 2014. <http://www.icleiusa.org/library/documents/training-workshop-report/view>

⁹ Garfin, G., G. Franco, H. Blanco, A. Comrie, P. Gonzalez, T. Piechota, R. Smyth, and R. Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486. doi:10.7930/J08G8HMN.

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models project that *San Diego will likely warm 2-3 °F by 2050* under the relatively low GHG emissions scenario (RCP 4.5). Greater warming can be expected in inland areas than along the coast. Under the higher emissions scenario (RCP 8.5), the warming trend becomes significantly more pronounced after 2050. This tendency occurs in coastal and inland areas.

4.3.1.2 Heat Waves

For this analysis, the definition of a heat wave is the occurrence of the 98th percentile maximum temperature calculated from the historical period of 1970-2000 for at least one day. For coastal areas, a heat wave is defined as at least one day with the temperature reaching 83 °F or higher. For inland areas, a heat wave is at least one day with the temperature reaching 116 degrees °F or higher.

By this definition, heat waves occur about 2 times per year in San Diego's present climate. However, *heat waves are projected to increase in frequency and intensity* (higher maximum temperatures) over the 21st century. By mid-century, the San Diego region could see heat waves occurring 12-16 times per year. *Heat waves are also projected to increase in duration* (number of days). In the current climate, heat waves last 2 days on average. By mid-century, heat waves are projected to last 3-4 days on average.

4.3.1.3 Sea Level Rise

Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century.¹⁰ The table below shows the ranges of sea level rise that the California Coastal Commission¹¹ recommends local jurisdictions plan for based on the National Research Council's (NRC) report on Sea Level Rise in California, Oregon and Washington: Past Present and Future.¹² *San Diego is projected to experience up to two feet of sea level rise by mid-century.*

NRC Average Sea Level Rise Projections for South of Cape Mendocino

Time Period	Range	Central Estimate
2000-2030	4 to 30 cm (.13 to .98 ft)	14.7 ± 5.0 cm
2000-2050	12 to 61 cm (.39 to 2.0 ft)	28.4 ± 9.2 cm
2000-2100	42 to 167 cm (1.38 to 5.48 ft)	91.9 ± 24.9 cm

4.3.1.4 High Sea Level Events

It's not only important to consider increases in average sea level, but also consider other fluctuations that will occur on top of the increase in the average, such as high astronomical tides, wind, waves, and storm surge. These fluctuations produce high sea level events.

This analysis of high sea levels uses a model that includes sea level rise, weather, and tidal-related fluctuations in sea level. This analysis defines a high sea level as the 99.99th percentile hourly sea level

¹⁰ California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2013. "Indicators of Climate Change in California."

¹¹ California Coastal Commission Draft Sea Level Rise Policy Guidance (2013) http://www.coastal.ca.gov/climate/slr/guidance/CCC_Draft_SLR_Guidance_PR_10142013.pdf

¹² Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future (2012). http://www.nap.edu/catalog.php?record_id=13389

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calculated for the period 1970-1999. The analysis sums the total number of hours in a year that the sea level is at or above this threshold.

The chart below illustrates how as the annual mean sea level increases, *San Diego's shoreline will see increasingly more hours of high sea levels as the century progresses*. In the present climate, San Diego experiences one hour of high sea levels per year on average. By the 2030 period, high sea levels occur 12 hours per year on average. By mid-century, this increases to 62 hours per year. These high sea levels put more natural ecosystems (beaches, cliffs, wetlands) and man-made infrastructure at risk of exposure to flooding and wave action.

High Sea Levels Trend Chart:

4.3.2 Sea Level Rise, Coastal Storms, Erosion and Tsunami

4.3.2.1 Nature of Hazard

These four hazards were mapped and profiled as a group because many of the factors and risks involved are similar and limited to the coastal areas. Coastal storms can cause increases in tidal elevations (called storm surge), wind speed, and erosion. The most dangerous and damaging feature of a coastal storm is storm surge. Storm surges are large waves of ocean water that sweep across coastlines where a storm makes landfall. Storm surges can inundate coastal areas, wash out dunes, and cause backwater flooding. If a storm surge occurs at the same time as high tide, the water height will be even greater.

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With up to two feet of sea level rise projected by 2050, low-lying areas could become inundated more frequently and with increasingly higher water levels. In addition, storm related flooding may reach farther inland and occur more often¹³. Beaches and cliffs could also see increased erosion as they are exposed to more hours of high sea levels and wave action.¹⁴ The NOAA Sea Level Rise Viewer allows for planners to predict the impact of sea level rise over the next several decades. It can be found at <https://coast.noaa.gov/digitalcoast/tools/slr>.

According to the Sea Level Rise Adaptation Strategy for the San Diego Bay, the sectors most vulnerable to sea level rise are storm water, wastewater, shoreline parks, transportation facilities, commercial buildings, and ecosystems. Low-lying communities, such as Imperial Beach, Coronado, Mission Beach, and parts of La Jolla Shores, Del Mar, and Oceanside may be particularly vulnerable to sea level rise.¹⁵ In addition, some of San Diego's military installations and the region controlled by the Port of San Diego may also be affected.¹⁶ According to the County of San Diego Local Coastal Program Land Use Plan, (dated February 2017), fewer than one percent of the residents of San Diego County reside in areas at risk of inundation from a 55-inch rise in sea level by 2100. Based on that information, sea level rise is considered (on a scale of low, medium, high, very high) a low hazard for the region.

Coastal erosion is the wearing away of coastal land. It is commonly used to describe the horizontal retreat of the shoreline along the ocean, and is considered a function of larger processes of shoreline change, which include erosion and accretion. Erosion results when more sediment is lost along a particular shoreline than is re-deposited by the water body, and is measured as a rate with respect to either a linear retreat or volumetric loss. Erosion rates are not uniform and vary over time at any single location. Various locations along the Coast of San Diego County are highly susceptible to erosion. Erosion prevention and repair measures such as installation of seawalls and reinforcement of cliffs have been required in different locations along the San Diego coast in the past. The risk of coastal erosion in San Diego County is considered medium.

- A tsunami is a series of long waves generated in the ocean by a sudden displacement of a large volume of water. Underwater earthquakes, landslides, volcanic eruptions, meteoric impacts, or onshore slope failures can cause this displacement. Tsunami waves can travel at speeds averaging 450 to 600 miles per hour. As a tsunami nears the coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. After a major earthquake or other tsunami-inducing activity occurs, a tsunami could reach the shore within a few minutes. One coastal community may experience no damaging waves while another may experience very destructive waves. Some low-lying areas could experience severe inland inundation of water and deposition of debris more than 3,000 feet inland. Historically the impact of Tsunamis on the San Diego coastline has been low, but inundation maps developed by the California Office of Emergency Services and the California Geologic Survey show the potential for moderate damage along low-lying areas. The California Geologic Survey has developed Tsunami Inundation maps that can be found at http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps.

¹³ San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

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4.3.2.2 Disaster History

There were eleven (11) Proclaimed States of Emergency for Weather/Storms in San Diego County between 1950 and 2017. In January and February 1983, the strongest-ever El Nino-driven coastal storms caused over 116 million dollars in beach and coastal damage. Thirty-three homes were destroyed and 3900 homes and businesses were damaged. Other coastal storms that caused notable damage were during the El Nino winters of 1977-1978 and 1997-1998 and 2003-2004. Other Proclamations occurred in December 2010, July 2015, and February 2017. The City of San Diego proclaimed for winter storms in 2013.

Coastal erosion is an ongoing process that is difficult to measure, but can be seen in various areas along the coastline of San Diego County. Unstable cliffs at Beacon's Beach in Encinitas caused a landslide that killed a woman sitting on the beach in January 2000. In 1942, the Self-Realization Fellowship building fell into the ocean because of erosion and slope failure caused by groundwater oversaturated the cliffs it was built on.

Wave heights and run-up elevations from tsunami along the San Diego Coast have historically fallen within the normal range of the tides (Joy 1968). The largest tsunami effect recorded in San Diego since 1950 was May 22, 1960, which had a maximum wave height 2.1 feet (NOAA, 1993). In this event, 80 meters of dock were destroyed and a barge sunk in Quivera Basin. Other tsunamis felt in San Diego County occurred on November 5, 1952, with a wave height of 2.3 feet and caused by an earthquake in Kamchatka; March 9, 1957, with a wave height of 1.5 feet; May 22, 1960, at 2.1 feet; March 27, 1964 with a wave height of 3.7 feet, September 29, 2009 with a wave height of 0.5 feet, February 2010 with a wave height of 0.6 meters, and in June, 2011 with wave height of 2 feet.. It should be noted that damage does not necessarily occur in direct relationship to wave height, illustrated by the fact that the damages caused by the 2.1-foot wave height in 1960 were worse than damages caused by several other tsunamis with higher wave heights.

4.3.2.3 Location and Extent/Probability of Occurrence and Magnitude

Figure 4.3.1 displays the location and extent of coastal storm/coastal erosion/tsunami hazard areas for the County of San Diego. As shown in this figure, the highest risk zones in San Diego County are located within the coastal zone of San Diego County. Coastal storm hazards are most likely during El Nino events. As shown on Figure 4.3.1, maximum wind speeds along the coast are not expected to exceed 60 miles per hour, resulting in only minor wind-speed related damage. Coastal erosion risk is highest where geologically unstable cliffs become over-saturated by irrigation or rainwater. The greatest type of tsunami risk is material damage to small watercraft, harbors, and some waterfront structures (Joy 1968), with flooding along the coast as shown in the run-up projections on Figure 4.3.1.

As stated above, the risk of damage from seal level rise is considered somewhat likely with the risk of damage from coastal erosion considered to be likely and from tsunami highly likely.

Data used to profile this group of hazards included the digitized flood zones from the FEMA FIRM Flood maps, NOAA historical shoreline data, and Caltrans' coastal zone boundary for the coastal storm/erosion hazard (refer to Appendix B for complete data matrix). Maximum tsunami run up projections modeled by the University of Southern California and distributed by the California Office of Emergency Services were used for identifying tsunami hazard. The tsunami model was the result of a combination of inundation modeling and onsite surveys and shows maximum projected inundation levels from tsunamis along the entire coast of San Diego County. NOAA historical tsunami effects data were also used, which showed

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locations where tsunami effects have been felt, and when available, details describing size and location of earthquakes that caused the tsunamis. *The Shoreline Erosion Assessment and Atlas of the San Diego Region Volumes I and II* (SANDAG, 1992) were reviewed for the shoreline erosion category. This publication shows erosion risk levels of high, moderate and low for the entire coastline of San Diego County.

For modeling purposes, the VE Zone of the FEMA FIRM map series was used as the high hazard value for coastal storms and coastal erosion. The VE Zone is defined by FEMA as the coastal area subject to a velocity hazard (wave action). Coastal storm and erosion risk were determined to be high if areas were found within the VE zone of the FEMA FIRM maps. Tsunami hazard risk levels were determined to be high if an area was within the maximum projected tsunami run-up and inundation area.

COASTAL STORM/EROSION/Tsunami COUNTY OF SAN DIEGO (1 OF 4) HAZARD MITIGATION PLANNING

Maximum Tsunami Projected Runup Erosion/Coastal Storm Layers:

- Maximum Tsunami Projected Runup Erosion/Coastal Storm Layers
- FEMA VE Zone (High Risk)

Base Layers:

- Incorporated City Boundary
- Freeways/Highways
- Major Roads
- Lakes
- Rivers
- Streams

Map Labels: SAN DIEGO, CORONADO, NATIONAL CITY, CHULA VISTA, IMPERIAL BEACH

Inset Map: Shows San Diego County with a red box indicating the area shown in the main map.

Scale: 0 1 2 Miles

Logos: LUEGGIS, OES

Source: LUGGIS, Incorporated City Boundaries, Rivers, Lakes, Stream Networks, Erosion Control

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4.3.3 Dam Failure

4.3.3.1 Nature of Hazard

Dam failures can result in severe flood events. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, lifeline disruption, and environmental damage. A dam failure is usually the result of age, poor design, or structural damage caused by a major event such as an earthquake or flood.

4.3.3.2 Disaster History

Two major dam failures have been recorded in San Diego County. The Hatfield Flood of 1916 caused the failure of the Sweetwater and Lower Otay Dams, resulting in 22 deaths. Most of those deaths were attributed to the failure of Lower Otay Dam (County of San Diego Sanitation and Flood Control, 2002).

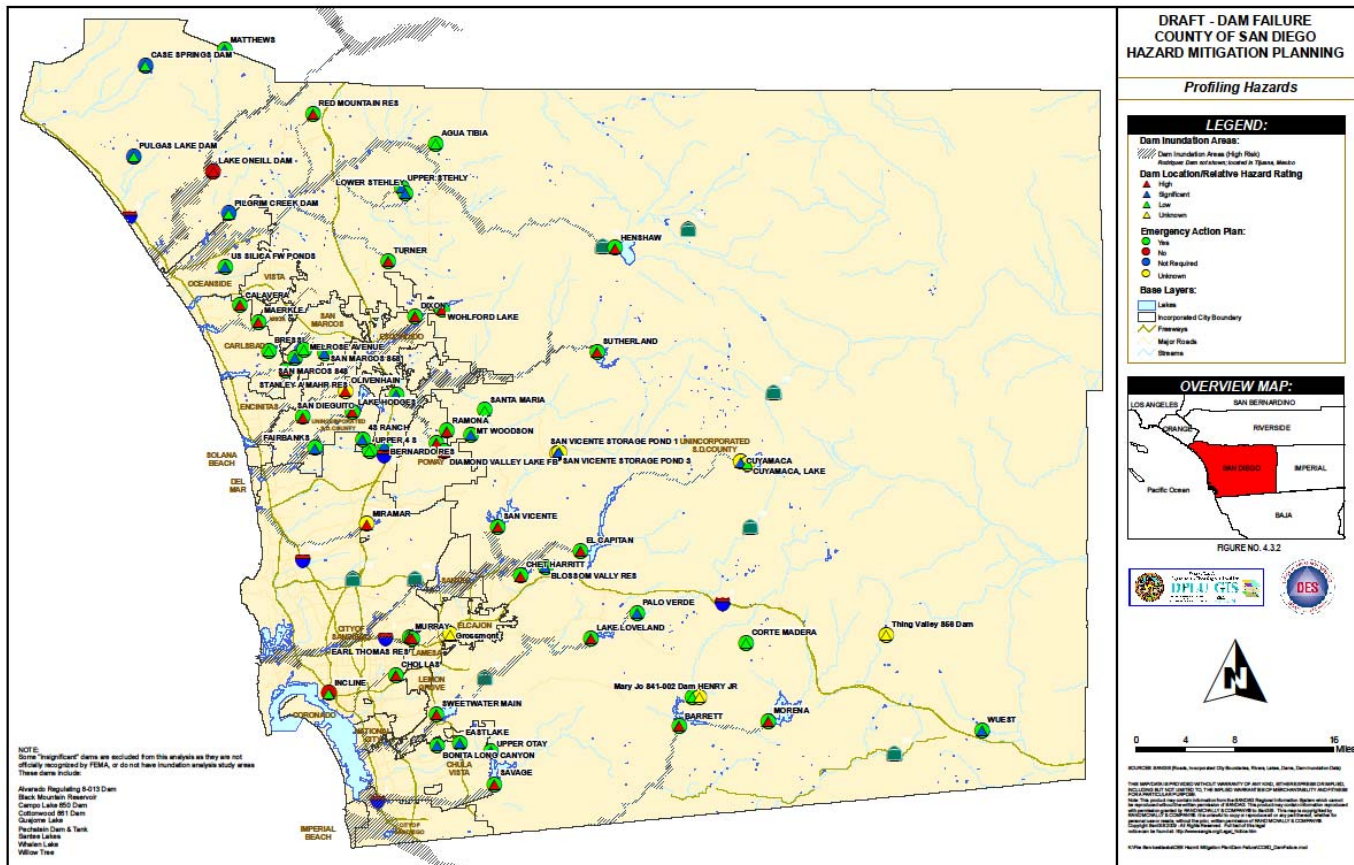
4.3.3.3 Location and Extent/Probability of Occurrence and Magnitude

Figure 4.3.2 displays the location and extent of dam failure hazard areas for the County of San Diego. Dam failures are rated as one of the major “low-probability, high-loss” events.

Dam inundation map data were used to profile dam failure risk levels (refer to Appendix B for complete data matrix). These maps were created by agencies that own and operate dams. OES obtained this data from SanGIS, a local GIS data repository. The dam inundation map layers show areas that would be flooded in the event of a dam failure. If an area lies within a dam inundation zone, it was considered at high risk. A dam is characterized as high hazard if it stores more than 1,000 acre-feet of water, is higher than 150 feet tall, has potential for downstream property damage, and potential for downstream evacuation. Ratings are set by FEMA and confirmed with site visits by engineers. A simple way to define high risk of dam failure is if failure of the dam is likely to result in loss of human life. Most dams in the County are greater than 50 years old and are characterized by increased hazard potential due to downstream development and increased risk due to structural deterioration in inadequate spillway capacity (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2014). The potential for dam failure is considered to be somewhat likely.

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Figure 4.3.2



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4.3.4 Earthquake

4.3.4.1 Nature of Hazard

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can further amplify ground motions. The severity of these effects is dependent on the amount of energy released from the fault or epicenter. One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g". A 100% g earthquake is very severe. More damage tends to occur from earthquakes when ground acceleration is rapid. Peak ground acceleration (PGA) is a measure of the strength of ground movement. PGA measures the rate in change of motion relative to the established rate of acceleration due to gravity (980 cm/sec/sec). PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values are used for reference in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazard between sites, when making economic and safety decisions.

Another tool used to describe earthquake intensity is the Richter scale. The Richter scale was devised as a means of rating earthquake strength and is an indirect measure of seismic energy released. The scale is logarithmic with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. In terms of actual energy released, however, each one-point increase on the Richter scale corresponds to about a 32-fold increase in energy released. Therefore, a magnitude (M) 7 earthquake is 100 times (10×10) more powerful than a M5 earthquake and releases 1,024 times (32×32) the energy. An earthquake generates different types of seismic shock waves that travel outward from the focus or point of rupture on a fault. Seismic waves that travel through the earth's crust are called body waves and are divided into primary (P) and secondary (S) waves. Because P waves move faster (1.7 times) than S waves they arrive at the seismograph first. By measuring the time delay between arrival of the P and S waves and knowing the distance to the epicenter, seismologists can compute the Richter scale magnitude for the earthquake.

The Modified Mercalli Scale (MMI) is another means for rating earthquakes, but one that attempts to quantify intensity of ground shaking. Intensity under this scale is a function of distance from the epicenter (the closer to the epicenter the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage. This rates the level of severity of an earthquake by the amount of damage and perceived shaking (Table 4.3-1).

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Table 4.3-1
Modified Mercalli Intensity Scale

MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
I.			Not felt
II.			Felt by persons at rest, on upper floors, or favorably placed.
III.			Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV.			Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motorcars rock. Windows, dishes, doors rattle. In the upper range of IV, wooden walls and frame creak.
V.	Light	Pictures Move	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clock stop, start, change rate.
VI.	Moderate	Objects Fall	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked.
VII.	Strong	Nonstructural Damage	Difficult to stand. Noticed by drivers of motorcars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices. Some cracks in masonry C. Small slides and caving in along sand or gravel banks. Concrete irrigation ditches damaged.
VIII.	Very Strong	Moderate Damage	Steering of motorcars affected. Damage to masonry C, partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, and elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Cracks in wet ground and on steep slopes.
IX.	Very Violent	Extreme Damage	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land.
X.			Rails bent greatly. Underground pipelines completely out of services.
XI.			Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.

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Several major active faults exist in San Diego County, including the Rose Canyon, La Nacion, Elsinore, San Jacinto, Coronado Bank and San Clemente Fault Zones. The Rose Canyon Fault Zone is part of the Newport-Inglewood fault zone, which originates to the north in Los Angeles, and the Vallecitos and San Miguel Fault Systems to the south in Baja California (see Figure 4.3.3). The Rose Canyon Fault extends inland from La Jolla Cove, south through Rose Canyon, along the east side of Mission Bay, and out into San Diego Bay. The Rose Canyon Fault is considered to be the greatest potential threat to San Diego as a region, due to its proximity to areas of high population. The La Nacion Fault Zone is located near National City and Chula Vista. The Elsinore Fault Zone is a branch of the San Andreas Fault System. It originates near downtown Los Angeles, and enters San Diego County through the communities of Rainbow and Pala; it then travels in a southeasterly direction through Lake Henshaw, Santa Ysabel, Julian; then down into Anza-Borrego Desert State Park at Agua Caliente Springs, ending at Ocotillo, approximately 40 miles east of downtown. The San Jacinto Fault is also a branch of the San Andreas Fault System. This fault branches off from the major fault as it passes through the San Bernardino Mountains. Traveling southeasterly, the fault passes through Clark Valley, Borrego Springs, Ocotillo Wells, and then east toward El Centro in Imperial County. This fault is the most active large fault within County of San Diego. The Coronado Bank fault is located about 10 miles offshore. The San Clemente Fault lies about 40 miles off La Jolla and is the largest offshore fault at 110 miles or more in length (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2014).

4.3.4.2 Disaster History

Historic documents record that a very strong earthquake struck San Diego on May 27, 1862, damaging buildings in Old Town and opening up cracks in the earth near the San Diego River mouth. This destructive earthquake was centered on either the Rose Canyon or Coronado Bank faults and descriptions of damage suggest that it had a magnitude of about 6.0 (M6). The strongest recently recorded earthquake in San Diego County was a M5.3 earthquake that occurred on July 13, 1986 on the Coronado Bank Fault, 25 miles west of Solana Beach. In recent years there have been several moderate earthquakes recorded within the Rose Canyon Fault Zone as it passes beneath the City of San Diego. Three temblors shook the city on 17 June 1985 (M3.9, 4.0, 3.9) and a stronger quake occurred on 28 October 1986 (M4.7) (Demere, SDNHM website 2003). The most recent significant earthquake activity occurred on June 15, 2004 with a M5.3 on the San Diego Trough Fault Zone approximately 50 miles SW of San Diego. It was reported as an IV on the MMI (Southern California Seismic Network).

4.3.4.3 Location and Extent/Probability of Occurrence and Magnitude

Figure 4.3.3 displays the location and extent of the profiled earthquake hazard areas for San Diego County. This is based on a USGS earthquake model that shows probabilistic peak ground acceleration for every location in San Diego County. Since 1984, earthquake activity in San Diego County has increased twofold over the preceding 50 years (Demere, SDNHM website 2003). All buildings that have been built in recent decades must adhere to building codes that require them to be able to withstand earthquake magnitudes that create a PGA of 0.4 or greater. Ongoing field and laboratory studies suggest the following maximum likely magnitudes for local faults: San Jacinto (M6.4 to 7.3), Elsinore (M6.5 to 7.3), Rose Canyon (M6.2 to 7.0), La Nacion (M6.2 to 6.6), Coronado Bank (M6.0 to 7.7), and San Clemente (M6.6 to 7.7) (Demere, SDNHM website 2003).

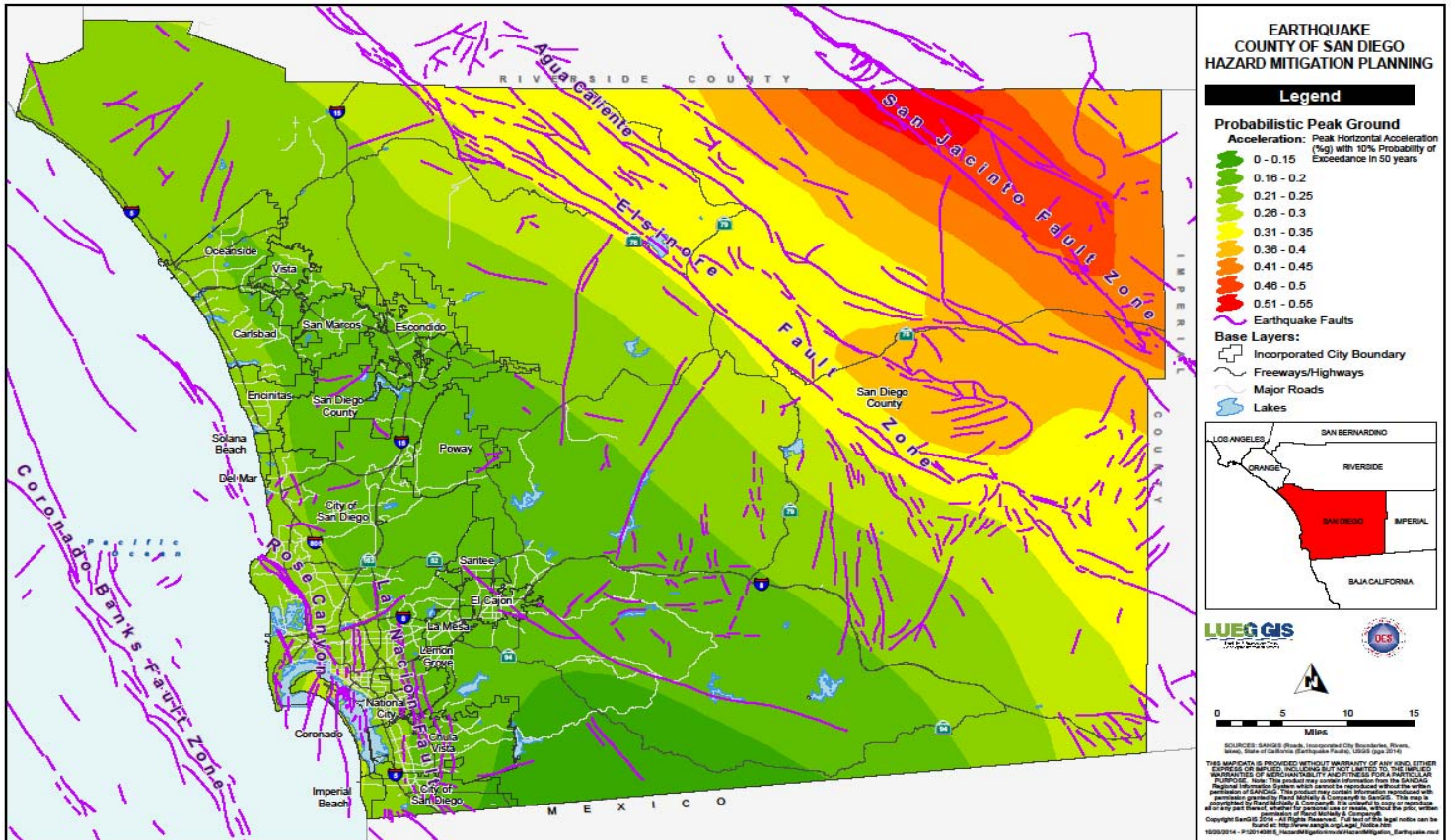
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Data used to profile earthquake hazard included probabilistic PGA data from the United States Geological Survey (USGS) and a Scenario Earthquake Shake map for Rose Canyon from the California Integrated Seismic Network (CISN) (refer to Attachment A for complete data matrix). From these data, the HMWG determined that risk level for earthquake is determined to be high if an area lies within a 0.3 or greater PGA designation. Earthquakes were modeled using HAZUS-MH, which uses base information to derive probabilistic peak ground accelerations much like the PGA map from USGS that was used for the profiling process.

The potential for an earthquake in the San Diego region is considered somewhat likely.

Figure 4.3.3



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4.3.5 Flood

4.3.5.1 Nature of Hazard

A flood occurs when excess water from snowmelt, rainfall, or storm surge accumulates and overflows onto a river's bank or to adjacent floodplains. Floodplains are lowlands adjacent to rivers, lakes, and oceans that are subject to recurring floods. Most injury and death from flood occurs when people are swept away by flood currents, and property damage typically occurs as a result of inundation by sediment-filled water. Average annual precipitation in San Diego County ranges from 10 inches on the coast to approximately 45 inches on the highest point of the Peninsular Mountain Range that transects the county, and 3 inches in the desert east of the mountains.

Several factors determine the severity of floods, including rainfall intensity and duration. A large amount of rainfall over a short time span can result in flash flood conditions. A sudden thunderstorm or heavy rain, dam failure, or sudden spills can cause flash flooding. The National Weather Service's definition of a flash flood is a flood occurring in a watershed where the time of travel of the peak of flow from one end of the watershed to the other is less than six hours. There are no watersheds in San Diego County that have a longer response time than six hours. In this county, flash floods range from the stereotypical wall of water to a gradually rising stream. The central and eastern portions of San Diego County are most susceptible to flash floods where mountain canyons, dry creek beds, and high deserts are the prevailing terrain.

4.3.5.2 Disaster History

From 1770 until 1952, 29 floods were recorded in San Diego County. Between 1950 and 1997, flooding prompted 10 Proclaimed States of Emergency in the County of San Diego. Several very large floods have caused significant damage in the County of San Diego in the past. The Hatfield Flood of 1916 destroyed the Sweetwater and Lower Otay Dams, and caused 22 deaths and \$4.5 million in damages. The flood of 1927 caused \$117,000 in damages, and washed out the Old Town railroad bridge (Bainbridge, 1997). The floods of 1937 and 1938 caused approximately \$600,000 in damages. (County of San Diego Sanitation and Flood Control, 1996). In the 1980 floods, the San Diego River at Mission Valley peaked at 27,000 cubic feet per second (cfs) and caused \$120 million in damage (Bainbridge, 1997).

Table 4.3-2 displays a history of flooding in San Diego County, as well as loss associated with each flood event.

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Date	Loss Estimation	Source of Estimate	Comments
1862	Not available	County of San Diego Sanitation and Flood Control	6 weeks of rain
1891	Not available	County of San Diego Sanitation and Flood Control	33 inches in 60 hours
1916	\$4.5 million	County of San Diego Sanitation and Flood Control	Destroyed 2 dams, 22 deaths
1927	\$117,000	County of San Diego Sanitation and Flood Control	Washed out railroad bridge Old Town
1937 & 1938	\$600,000	County of San Diego Sanitation and Flood Control	N/A
1965	Not available	San Diego Union	6 killed
1969	Not available	San Diego Union	All of State declared disaster area
1979	\$2,766,268	County OES	Cities of La Mesa, Lemon Grove, National City, San Marcos, San Diego and unincorporated areas
1980	\$120 million	County of San Diego Sanitation and Flood Control; Earth Times	San Diego river topped out in Mission Valley
Oct-87	\$640,500	State OES	N/A
1995	\$Tens of Millions	County OES	San Diego County Declared Disaster Area
2003	Not Available	County OES	Storm floods areas impacted by the 2003 firestorm.
Sept 2004	Not Available	San Diego Union-Tribune	Series of storms caused localized flooding
Oct 2004	Not Available	San Diego Union-Tribune	Flash-flood in Borrego Springs
Jan-Mar 2005	Not Available	Cal EMA (formerly State OES)	San Diego County Declared Disaster Area
Jan 2017	\$14.5 million (estimated)	County OES	San Diego County Declared Disaster Area

Table 4.3-2
Historical Records of Large Floods in San Diego County

4.3.5.3 Location and Extent/Probability of Occurrence and Magnitude

In regions such as San Diego, without extended periods of below-freezing temperatures, floods usually occur during the season of highest precipitations or during heavy rainfalls after long dry spells. The areas

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surrounding the river valleys in all of San Diego County are susceptible to flooding because of the wide, flat floodplains surrounding the riverbeds, and the numerous structures that are built in the floodplains. One unusual characteristic of San Diego's hydrology is that it has a high level of variability in its runoff. The western watershed of the County of San Diego extends about 80 miles north from the Mexican border and approximately 45 miles east of the Pacific Ocean. From west to east, there are about 10 miles of rolling, broken coastal plain, 10 to 15 miles of foothill ranges with elevations of 600 to 1,700 feet; and approximately 20 miles of mountain country where elevations range from 3,000 to 6,000 feet. This western watershed constitutes about 75% of the County, with the remaining 25% mainly desert country. There are over 3,600 miles of rivers and streams which threaten residents and over 200,000 acres of flood-prone property. Seven principle streams originate or traverse through the unincorporated area. From north to south they are the Santa Margarita, San Luis Rey, San Dieguito, San Diego, Sweetwater, Otay, and Tijuana Rivers (Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, 2006).

FEMA FIRM data was used to determine hazard risk for floods in the County of San Diego. FEMA defines flood risk primarily by a 100-year flood zone, which is applied to those areas with a 1% chance, on average, of flooding in any given year. Any area that lies within the FEMA-designated 100-year floodplain is designated as high risk. Any area found in the 500-year floodplain is designated at low risk. Base flood elevations (BFE) were also used in the HAZUS-MH modeling process. A BFE is the elevation of the water surface resulting from a flood that has a 1% chance of occurring in any given year (i.e. the height of the base flood).

Figure 4.3.4 displays the location and extent of flood hazard areas for the County of San Diego. As shown in this figure, high hazard (100-year floodway) zones in San Diego County are generally concentrated within the coastal areas, including bays, coastal inlets and estuaries. Major watershed areas connecting the local mountain range to the coastal region, where flash floods are more common, show several 100-year flood hazard areas.

Based on FEMA Records the San Diego region has not suffered severe repetitive loss (residential properties that have at least four NFIP payments over \$5,000 each with the cumulative claim exceeding \$20,000 or at least two separate claims payments with the cumulative amount exceeding the market value of the building) since 1974. There have been numerous repetitive losses (losses of at least \$1,000 each). These losses are provided in the table below:

Table 4.3-3
Repetitive Loss Due to Floods in San Diego County

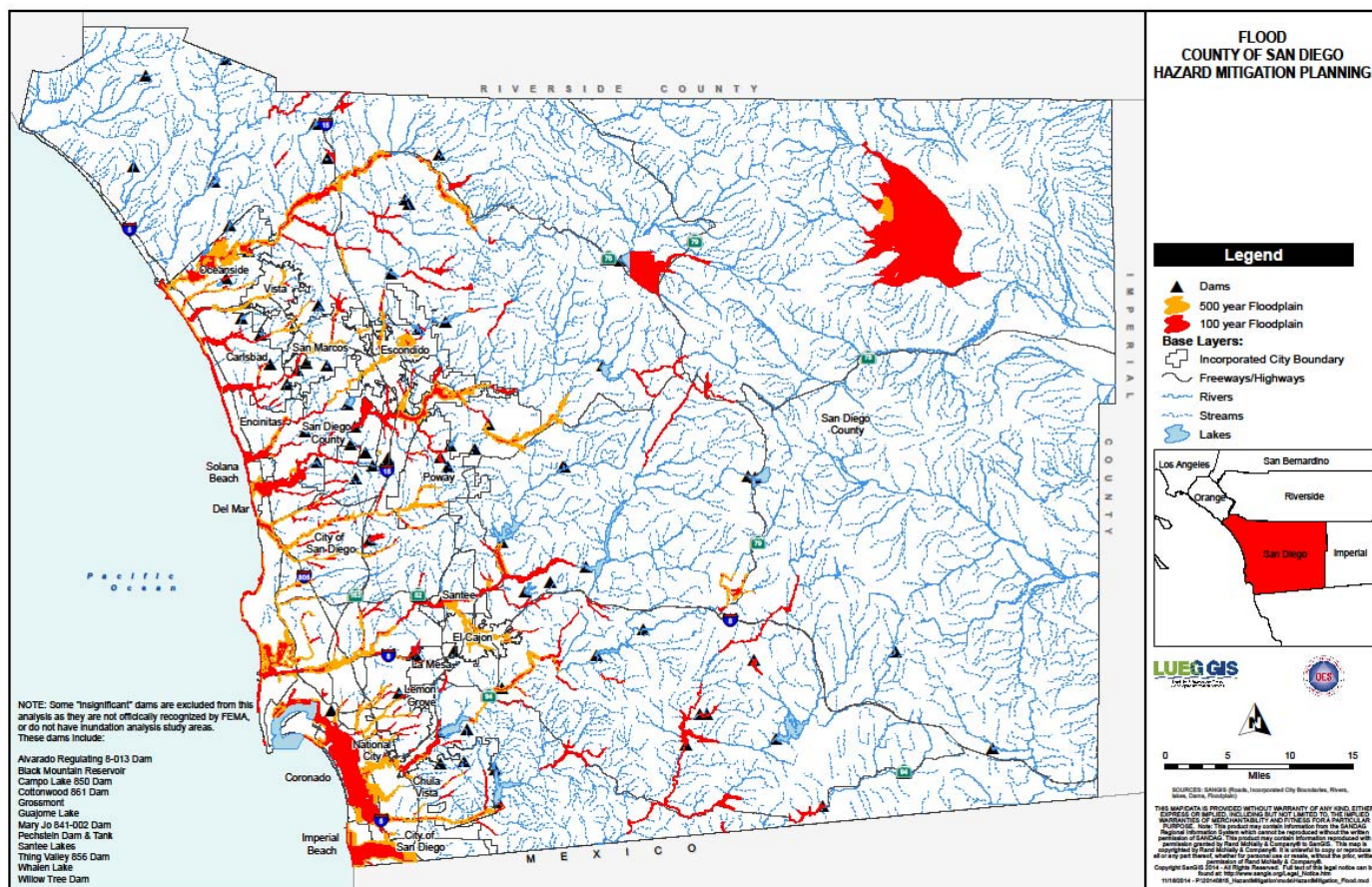
Jurisdiction	Number of Repetitive Losses	Jurisdiction	Number of Repetitive Losses	Jurisdiction	Number of Repetitive Losses
Carlsbad	1	Chula Vista	2	Coronado	0
Del Mar	13	El Cajon	4	Encinitas	2
Escondido	2	Imperial Beach	4	La Mesa	2
Lemon Grove	0	National City	2	Oceanside	15
Poway	7	San Diego	35	San Marcos	1
Santee	1	Solana Beach	6	Vista	2
County of San Diego	14				

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Based on the historical record, the likelihood of flooding in the San Diego region is highly likely.

Figure 4.3.4



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4.3.6 Rain-Induced Landslide

4.3.6.1 Nature of Hazard

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). Frequently they accompany other natural hazards such as floods, earthquakes, and volcanic eruptions. Although landslides sometimes occur during earthquake activity, earthquakes are rarely their primary cause. The most common cause of a landslide is an increase in the down slope gravitational stress applied to slope materials (oversteepening). This may be produced either by natural processes or by man's activities. Undercutting of a valley wall by stream erosion or of a sea cliff by wave erosion are ways in which slopes may be naturally oversteeped. Other ways include excessive rainfall or irrigation on a cliff or slope. Another type of soil failure is slope wash, the erosion of slopes by surface-water runoff. The intensity of slope wash is dependent on the discharge and velocity of surface runoff and on the resistance of surface materials to erosion. Surface runoff and velocity is greatly increased in urban and suburban areas due to the presence of roads, parking lots, and buildings, which have zero filtration capacities and provide generally smooth surfaces that do not slow down runoff.

Mudflows are another type of soil failure, and are defined as flows or rivers of liquid mud down a hillside. They occur when water accumulates under the ground, usually following long and heavy rainfalls. If there is no brush, tree, or ground cover to hold the soil, mud will form and flow down-slope.

4.3.6.2 Disaster History

Landslides and landslide prone sedimentary formations are present throughout the coastal plain of western San Diego County. Landslides also occur in the granitic mountains of East San Diego County, although they are less prevalent. Ancient landslides are those with subdued topographic expressions that suggest movements at least several hundred and possibly several thousands of years before present. Many of these landslides are thought to have occurred under much wetter climatic conditions than at present. Recent landslides are those with fresh or sharp geomorphic expressions suggestive of active (ongoing) movement or movement within the past several decades. Reactivations of existing landslides can be triggered by disturbances such as heavy rainfall, seismic shaking and/or grading. Many recent landslides are thought to be reactivations of ancient landslides.

Areas where significant landslides have occurred are: the Otay Mesa area, Oceanside, Mt. Soledad in La Jolla, Sorrento Valley, in the vicinity of Rancho Bernardo and Rancho Penasquitos, along the sides of Mission Gorge (San Carlos and Tierrasanta), western Santee, the Fletcher Hills area of western El Cajon, western Camp Pendleton, and the east side of Point Loma. Some of the more significant historical coastal bluff landslides have occurred along north La Jolla (Black's Beach), Torrey Pines, Del Mar, and Encinitas. Landslides tend to be more widespread in these areas where the underlying sedimentary formations contain weak claystone beds that are more susceptible to sliding.

Remedial grading and other mitigation measures have stabilized many but not all landslides in urban areas and other developments within San Diego County. Published geologic maps and other sources of information pertaining to landslide occurrence may not differentiate between known or suspected landslides. Moreover, published landslide maps (such as those used to compile the landslide areas for this effort) are not always updated or revised to reflect landslides that have been stabilized, or in some cases

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completely removed. The landslide maps for this study have been compiled for planning and emergency responses preparedness, and the compilation sources may not reflect current or existing conditions.

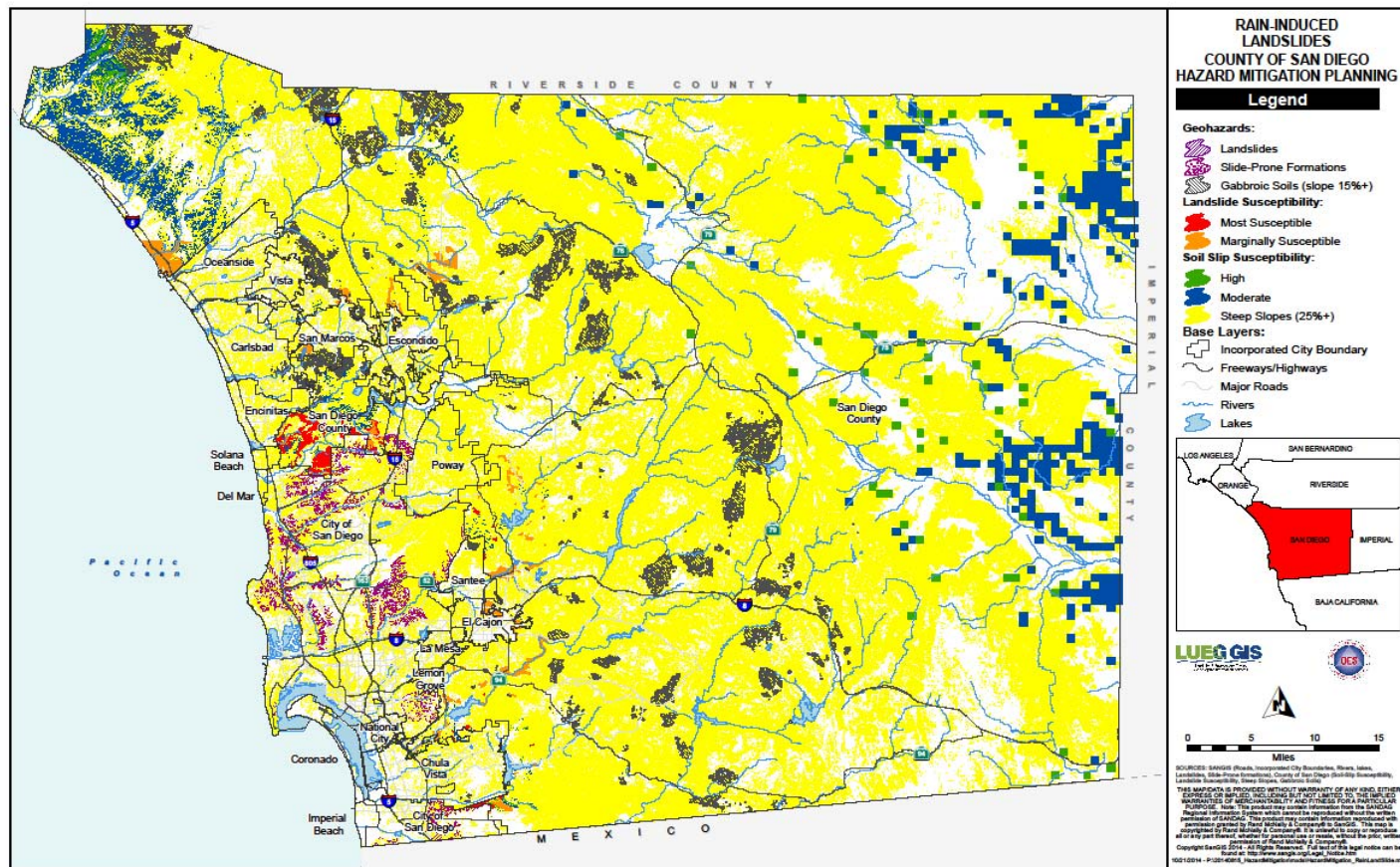
4.3.6.3 Location and Extent/Probability of Occurrence and Magnitude

Data used to determine landslide risk were steep slope (greater than 25%), soil series data (SANDAG, based on USGS 1970s series), and soil-slip susceptibility from USGS. Because landslide data in GIS format was not available for the entire county, a model was run using USGS soils and steep slope data to determine landslide risk areas for the entire County. Tan Landslide Susceptibility Maps that depict steep slope areas, landslide formations, and landslide susceptible areas based on a combination of slope, soils and geologic instability were also used in the analysis.

As shown in Figure 4.3.5, the location and extent of landslide hazard areas are generally concentrated along canyons near the coastal areas with steep slopes. The western portion of the county shows the soil-slip susceptibility data, while the eastern portion of the county shows the results of the model used to determine landslide risk for areas that were not included in the soil-slip susceptibility model. Housing development on marginal lands and in unstable but highly desirable coastal areas has increased the threat from landslides throughout San Diego County.

Based on historical occurrences the potential for a rain-induced landslide is considered likely.

Figure 4.3.5



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4.3.7 Liquefaction

4.3.7.1 Nature of Hazard

Liquefaction is the phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength. Lateral spreads develop on gentle slopes and entails the sidelong movement of large masses of soil as an underlying layer liquefies. Loss of bearing strength results when the soil supporting structures liquefies and causes structures to collapse.

4.3.7.2 Disaster History

Liquefaction is not known to have occurred historically in San Diego County, although liquefaction has occurred in the Imperial Valley in response to large earthquakes (Magnitude 6 or greater) originating in that area. Although San Diego is one of several major California cities in seismically active regions, ground failures or damage to structures has not occurred as a consequence of liquefaction. Historically, seismic shaking levels have not been sufficient to trigger liquefaction. Paleoseismic indicators of liquefaction have been recognized locally, and several pre-instrumental (prior to common use of seismographs) earthquakes could have been severe enough to cause at least some liquefaction.

4.3.7.3 Location and Extent/Probability of Occurrence and Magnitude

Recognizing active faults in the region, and the presence of geologically young, unconsolidated sediments and hydraulic fills, the potential for liquefaction to occur has been long recognized in the San Diego area. The regions of San Diego Bay and vicinity are thought to be especially vulnerable. The potential exists in areas of loose soils and/or shallow groundwater in earthquake fault zones throughout the County. Figure 4.3.6 displays the location and extent of areas with a risk of liquefaction.

Data used to profile liquefaction hazard included probabilistic PGA data from the United States Geological Survey (USGS) and a Scenario Earthquake Shake map for Rose Canyon from the California Integrated Seismic Network (CISN), along with existing liquefaction hazard areas from local maps (refer to Attachment A for complete data matrix). Liquefaction hazards were modeled as collateral damages of earthquakes using HAZUS-MH, which uses base information and NEHRP soils data to derive probabilistic peak ground accelerations much like the PGA map from USGS. Soils were considered because liquefaction risk may be amplified depending on the type of soil found in a given area. The National Earthquake Hazards Reduction Program (NEHRP) rates soils from hard to soft, and give the soils ratings from Type A through Type E, with the hardest soils being Type A, and the softest soils rated at Type E. Liquefaction risk was considered high if there were soft soils (Types D or E) present within an active fault zone. Liquefaction risk was considered low if the PGA risk value was less than 0.3, and hard soils were present (Types A-C). For example, an area may lie in a PGA zone of 0.2, which would be a low liquefaction risk in hard soils identified by the NEHRP. However, if that same PGA value is found within a soft soil such as Type D or E, a PGA of 0.2, when multiplied by 1.4 or 1.7 (amplification values for type D and E soil, shown below), would become a PGA value of at least 0.28 to 0.3. This would increase the liquefaction risk to high. Areas where soil types D or E are located are illustrated in Figure 4.3.6.

The potential for liquefaction in San Diego is considered somewhat likely.

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Soil Amplification Factors

	Soil Type				
PGA	A	B	C	D	E
0.1	0.80	1.00	1.20	1.60	2.50
0.2	0.80	1.00	1.20	1.40	1.70
0.3	0.80	1.00	1.10	1.20	1.20
0.4	0.80	1.00	1.00	1.10	0.90
0.5	0.80	1.00	1.00	1.00	0.80

[illegible]

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4.3.8 Structure/Wildfire Fire

4.3.8.1 Nature of Hazard

A structural fire hazard is one where there is a risk of a fire starting in an urban setting and spreading uncontrollably from one building to another across several city blocks, or within hi-rise buildings.

A wildfire is an uncontrolled fire spreading through vegetative fuels and exposing or possibly consuming structures. They often begin unnoticed and spread quickly. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. A wildland fire is a wildfire in an area in which development is essentially nonexistent, except for roads, railroads, power lines and similar facilities. An Urban-Wildland/Urban Interface fire is a wildfire in a geographical area where structures and other human development meet or intermingle with wildland or vegetative fuels. Significant development in San Diego County is located along canyon ridges at the wildland/urban interface. Areas that have experienced prolonged droughts or are excessively dry are at risk of wildfires.

People start more than 80 percent of wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires. Wildfire behavior is based on three primary factors: fuel, topography, and weather. The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. The continuity of fuels, expressed in both horizontal and vertical components is also a determinant of wildfire potential and behavior. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the speed at which the fire travels, and the ability of firefighters to reach and extinguish the fire. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind (both short and long term) affect the severity and duration of wildfires.

San Diego County's topography consists of a semi-arid coastal plain and rolling highlands which, when fueled by shrub overgrowth, occasional Santa Ana winds and high temperatures, creates an ever-present threat of wildland fire. Extreme weather conditions such as high temperature, low humidity, and/or winds of extraordinary force may cause an ordinary fire to expand into one of massive proportions.

Large fires would have several indirect effects beyond those that a smaller, more localized fire would create. These may include air quality and health issues, road closures, business closures, and others that increase the potential losses that can occur from this hazard. Modeling for a larger type of fire would be difficult, but the consequences of the three largest San Diego fires this century (October, 2003, October 2007 and May 2014) should be used as a guide for fire planning and mitigation.

4.3.8.2 Disaster History

Table 4.3-3 lists the most recent major wildfires in San Diego County. Wildland fires prompted five (5) Proclaimed States of Emergency, and Urban/Intermix Fires prompted four (4) Proclaimed States of Emergency in the County of San Diego between 1950-2014. In October of 2003 the second-worst wild-land fire in the history of San Diego County destroyed 332,766 acres of land, 3,239 structures and 17 deaths at a cost of \$450M. San Diego County's worst wildfire occurred in October 2007. At the height of the firestorm there were seven fires burning within the County. The fires destroyed 369,000 acres (13% of the County), 2,670 structures, 239 vehicles, and two commercial properties. There were 10 civilian deaths, 23 civilian injuries and 10 firefighter injuries. The cost of fire exceeded \$1.5 billion. San Diego County's third worst wildfire in history, known as the Laguna Fire, destroyed thousands of acres in the backcountry in September of 1970. The fire resulted in the loss or destruction of 383 homes and 1,200 other structures

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(\$5.7 million); 225,000 acres of trees and other watershed (\$30 million); small dams (\$3 million); and bridges and roads (\$600,000). The total dollar cost of the Laguna Fire was approximately \$40 million. The Bernardo, Poinsettia and Cocos Fires of May, 2014 burned 26,000 acres, destroyed 65 homes and damaged 19 others.

Table 4.3-3
Major Wildfires in San Diego County
Larger than 5,000 acres

Fire	Date	Acres Burned	Structures Destroyed	Structures Damaged	Deaths
Conejos Fire	July 1950	62,000	Not Available	Not Available	0
Laguna Fire	October 1970	190,000	382	Not Available	5
Harmony Fire (Carlsbad, Elfin Forest, San Marcos)	October 1996	8,600	122	142	1
La Jolla Fire (Palomar Mtn)	September 1999	7,800	2	2	1
Viejas Fire	January 2001	10,353	23	6	0
Gavilan Fire (Fallbrook)	February 2002	6,000	43	13	0
Pines Fire (Julian, Ranchita)	July 2002	61,690	45	121	0
Cedar Fire	October 2003	280,278	5,171	63	14
Paradise Fire	October 2003	57,000	415	15	2
Otay Fire	October 2003	46,291	6	0	0
Roblar (Pendleton)	October 2003	8,592	0	0	0
Mataguay Fire*	July 2004	8,867	2	0	0
Horse Fire*	July 2006	16,681	Not Available	Not Available	0
Witch Creek Fire*	October 2007	197,990	1,125	77	2
Harris Fire*	October 2007	90,440	255	12	5
Poomacha Fire*	October 2007	49,410	139	Not Available	0
Ammo Fire*	October 2007	21,004	Not Available	Not Available	0
Rice Fire*	October 2007	9,472	208	Not Available	0
Bernardo, Poinsettia & Cocos Fires	May 2014	26,000	65	19	0

* Information gathered from the California Department of Forestry and Fire Protection website

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4.3.8.3 Location and Extent/Probability of Occurrence and Magnitude

The wildfire risk maps use the most recent USGS Fire Regime data. Data for Regimes II and IV were utilized to develop the risk tables for the participating jurisdictions. Additional wildland fire hazard maps are available at http://www.fire.ca.gov/fire_prevention/fhsz_maps_sandiego. Perimeter maps for the three most significant wildfire events of the past 15 years, the 2003 and 2007 Firestorms and the 2014 North County wildfires, are below.

Under current climate conditions, the wildfire threat to property, lives, and ecosystems in the San Diego region is very high. With hotter temperatures and possibly fewer rainy days in the coming decades, vegetation could become drier. As a result, it is likely that San Diego region will see an increase in the frequency and intensity of fires, making the region more vulnerable to devastating fires like the ones seen in 2003 and 2007.¹⁷ The fire season could also become longer and less predictable, making firefighting efforts more costly.¹⁸ Using the scale described in Section 4.2.3 the potential for a wildfire in the San Diego region is considered highly likely.

Building density is also a factor in potential building loss during a wildfire. A recent study in the Ecological Society of America's publication *Ecological Applications*¹⁹ indicates that the area of the building clusters, the number of buildings in the cluster and building dispersion all contribute to the potential for building loss. While all three factors had a positive influence on the number of structures lost, larger building structures were most strongly associated with building loss. The likeliest reason being that more buildings are exposed. Two other top factors were the number of buildings in the cluster and the distance to the nearest building. In the mediterranean California model the closer the buildings were to each other the less likely they were to be affected.

An increase in wildfire also impacts public health. Fire-related injuries and death are likely to increase as wildfires occur more frequently.²⁰ Wildfires can also be a significant contributor to air pollution. Wildfire smoke contains numerous toxic and hazardous pollutants that are dangerous to breath and can worsen lung disease and other respiratory conditions.²¹

¹⁷ San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

¹⁸ Ibid.

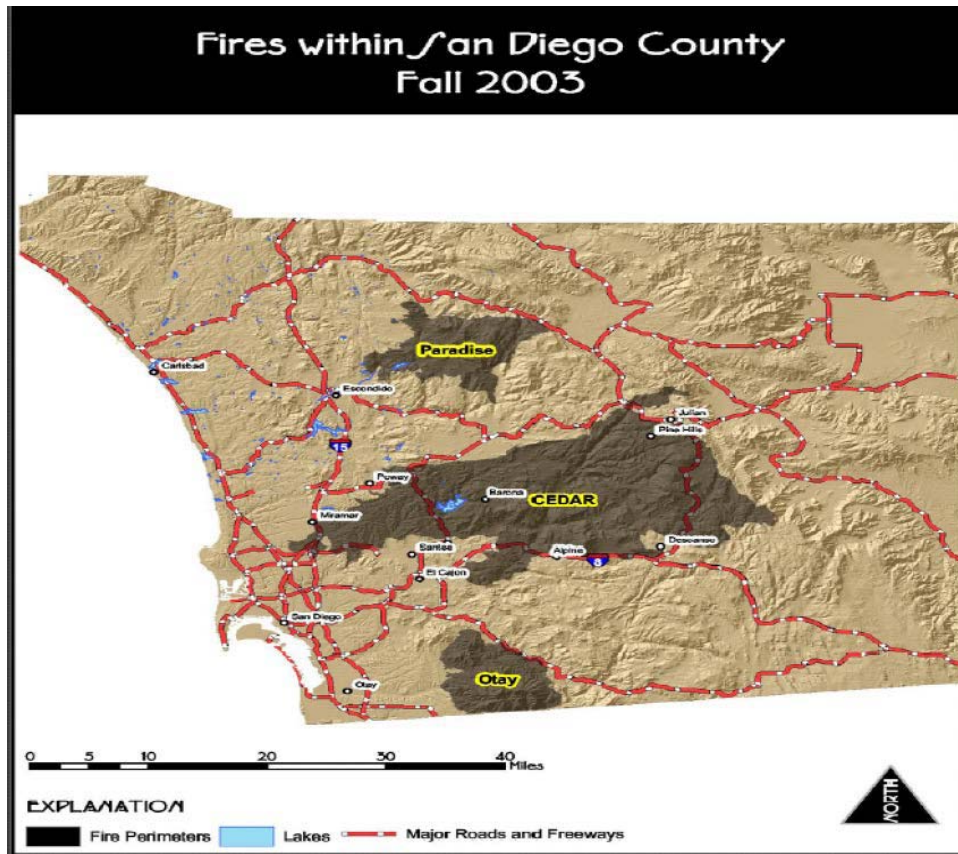
¹⁹ Alexander, Patricia M., et. al. (2016). Factors related to Building Loss Due to Wildfires in the Conterminous United States. *Ecological Applications*, 0(0), 1-16.

²⁰ Ibid.

²¹ Ibid.

[illegible]

2003 Wildfire Perimeter Map



**San Diego County
0930 Hrs UPDATE
October 31, 2007**

Perimeters from
CAL FIRE
MODIS Satellite Data
WebEOC information,
City of San Diego Fire.

- Local Assistance Centers
- Shelters
- Presumps
- Ignite Fire Perimeters
- Ignite Fire Control Areas
- Thermal Imaging Pages
- Lakes

Home Fire

Rio Canyon Fire

**Colorado Hills Fire
10% Contained**

Waco - Gaugita - Poomacha Complex

**McCoy Fire
100% Contained**

Coronado Fire

Horn Fire

Pacific Ocean

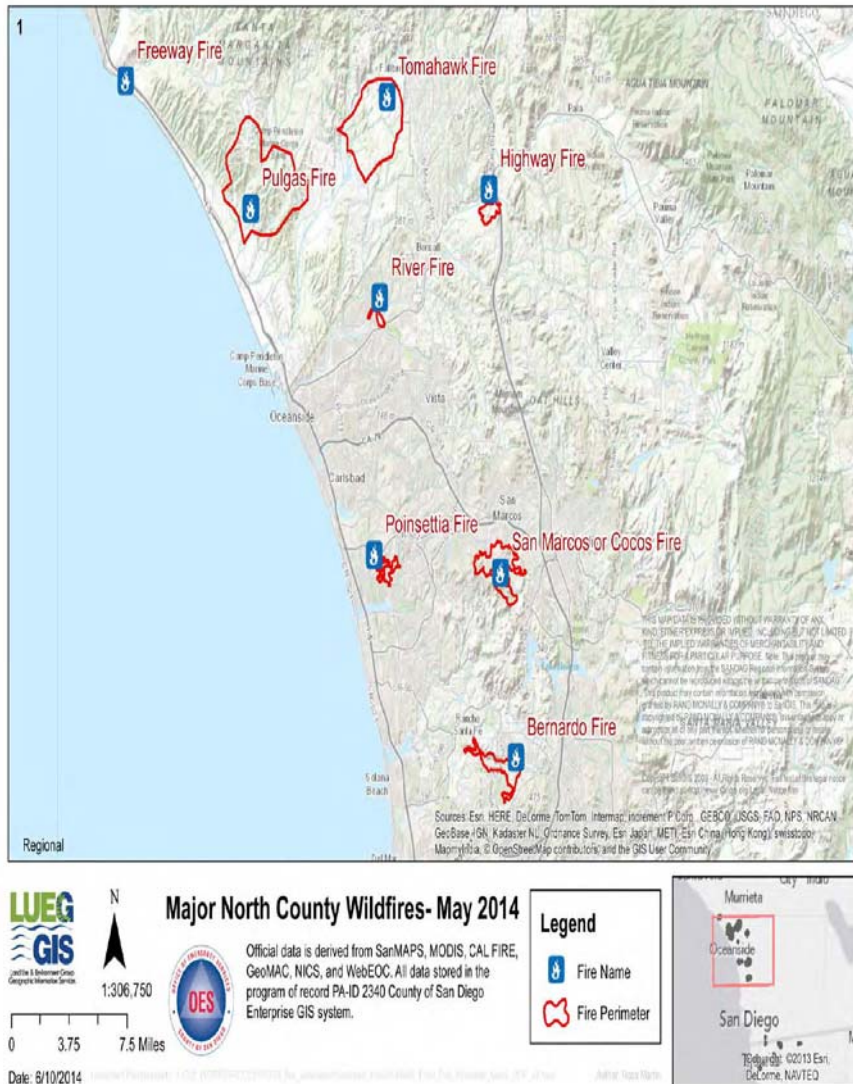
Scale: 0 2.5 6 10 Miles

Inset Map of California

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2014 North County Wildfires Perimeter Map

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4.3.9 Extreme Heat

4.3.9.1 Nature of the Hazard

Although extreme heat does not cause structural damage like floods, fires, and earthquakes, heat waves claim many lives due to heat exhaustion and heat stroke. According to a California Energy Commission Study, from 1994 to 2009, heat waves have claimed more lives in California than all declared disaster events combined.²² Despite this history, not a single heat emergency was formally proclaimed at the state level or as a federal disaster between 1960 and 2008. The author of an account of a heat wave which killed 739 people in Chicago in July 1995 suggests that the hidden nature of social vulnerability combined with the inconspicuous nature of heat events (unlike floods, fires, and earthquakes) prevent them from being declared as legitimate disasters.²³ However, the California State Hazard Mitigation Plan considers extreme heat a legitimate disaster type.²⁴

Extreme heat is exacerbated by the “urban heat island effect”, whereby impervious surfaces, such as concrete and asphalt, absorb heat and result in greater warming in urban areas compared to rural areas. Urban heat islands exacerbate the public health impacts that heat waves have upon the more vulnerable populations.²⁵ San Diego County has among the highest percentages of impervious surfaces in the states, increasing the potential impacts of heat islands.²⁶ In fact, Southern California’s urban centers are warming more rapidly than other parts of the state.²⁷

Extreme heat events put vulnerable populations, such as the elderly, children, chronically ill, and people who work outside at risk of heat-related illnesses and even death. Extreme heat events highlight the importance of thoughtful social vulnerability analysis.²⁸ For example, socially isolated elderly persons are especially vulnerable. People who live in urban areas with high impervious surface coverage and no access to air conditioning are also especially vulnerable. In California, San Diego County ranks second, behind Los Angeles, in absolute numbers of the elderly and children less than five years of age. These two populations are most likely to suffer from heat-related illnesses and heat events.²⁹

Extreme heat also has secondary impacts, such as power outages and poor air quality. Heat events, and the increased use of air conditioning, can lead to power outages, which makes the events even more

²² Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

²³ Klinenberg, Eric. *Heat Wave: A Social Autopsy of Disaster in Chicago*, The University of Chicago, 2002

²⁴ Governor’s Office of Emergency Services (2013) California Multi-Hazard Mitigation Plan

²⁵ Ibid.

²⁶ English et al. (2007). Executive Summary, Heat-Related Illness and Mortality Information for the Public Health Network in California

²⁷ Ibid.

²⁸ Governor’s Office of Emergency Services (2013) California Multi-Hazard Mitigation Plan

²⁹ English et al. (2007). Executive Summary, Heat-Related Illness and Mortality Information for the Public Health Network in California

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dangerous.³⁰ Hotter temperatures may also lead to poorer air quality because ozone formation, a component of smog, increases with higher temperatures.³¹

4.3.9.2 Disaster History

Following the events of 2006 when there was a prolonged period of extreme heat across the state of California, San Diego County developed an Excess Heat Preparedness and Response Plan.³²

According to the Spatial Hazard Events and Losses Database for the United States (SHELDUS) there have been four extreme heat events in San Diego in the past 18 years resulting in 4 heat related fatalities and 28 heat related injuries.

4.3.9.3 Location and Extent/Probability of Occurrence and Magnitude

San Diego is facing an increase in the frequency, duration, and strength of heat waves in the coming decades. While greater warming is expected in inland areas, residents of coastal areas are vulnerable when the temperature spikes, because they are less accustomed to the heat and they are less likely to have air conditioning. Research also indicates that heat waves are likely to become more humid in the future and with nighttime temperatures staying high, further stressing public health.³³ Extreme warm temperatures in the San Diego region mostly occur in July and August, but as climate warming takes hold, the occurrences of these events will likely begin in June and could continue to take place into September.³⁴

The potential for extreme heat event is considered highly likely.

³⁰ Ibid.

³¹ USGCRP (2009). *Global Climate Change Impacts in the United States*. Karl, T.R., J.M. Melillo, and T.C. Peterson (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA.

³² Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

³³ Gershunov, A., and K. Guirguis (2012), California heat waves in the present and future, *Geophysical Research Letters*, 39, L18710

³⁴ Messner, Steven, Sandra C. Miranda, Karen Green, Charles Phillips, Joseph Dudley, Dan Cayan, Emily Young. Climate Change Related Impacts in the San Diego Region by 2050. PIER Research Report, CEC-500-2009-027-D, Sacramento, CA: California Energy Commission. 2009.

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4.3.10 Drought/Water Supply

4.3.10.1 Location and Extent/Probability of Occurrence and Magnitude

Climate Change and Drought/Water Supply

Warming temperatures statewide could result in reduced water supply for the San Diego region. The State Water Project and Colorado River provide 75% to 95% of the water supply for the San Diego region, depending on the year.³⁵ Both of these water supplies originate in mountain snowpack. Over the past 50 years across most of the Southwest, there has been less late-winter precipitation falling as snow, earlier snowmelt, and earlier arrival of most of the year's streamflow.³⁶ Projections of further warming will result in reduced snowpack, which could translate into reduced water supply for the San Diego region's cities, agriculture, and ecosystems.³⁷ In fact, studies indicate that San Diego's sources of water could shrink by 20 percent or more by 2050.³⁸ An additional threat to water supply is the vulnerability of the levees protecting the California Delta, which feeds the State Water Project.³⁹ According to the California Adaptation Planning Guide, jurisdictions in the San Diego region must carefully consider the vulnerability of their water supply.⁴⁰

At the same time that the San Diego region's water supply is likely to decrease, water demand is expected to increase approximately 29% by 2050 due to economic growth and population pressures.⁴¹ Local water managers also report that higher temperatures could lead to increased demand for water for irrigation. Water shortages could become more frequent and more severe in the future, straining the local economy. The potential for drought in San Diego is highly likely.

Off-setting this slightly is the desalinization plant in Carlsbad. The plant, designed to produce 50 million gallons per day, is estimated to provide 8% of the regions water resources by 2020.

A U.S. Drought Monitor, using the Palmer Drought Severity Index, can be found at <http://droughtmonitor.unl.edu/>

4.3.10.2 History of Drought in San Diego

The depression ear drought of 1929-1934 was the worst drought in California's history. Its impact was felt statewide. At that time San Diego was self-sufficient relying on local water supplies. The region would not begin to import water until 1947.

The drought of 1987-1992 was extremely severe and resulted in the Metropolitan Water District ordered a 50% reduction in water use. The San Diego County Water Authority actually considered banning outdoor water use. The rains of "Miracle March" in 1991 replenished rivers, reservoirs and the Sierra snowpack.

³⁵ Ibid.

³⁶ Garfin, G., G. Franco, H. Blanco, A. Comrie, P. Gonzalez, T. Piechota, R. Smyth, and R. Waskom, 2014: Ch. 20: Southwest. *Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 462-486. doi:10.7930/J08G8HMN.

³⁷ California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

³⁸ San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

³⁹ California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

⁴⁰ Ibid.

⁴¹ San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation

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Another drought occurred in 2007 and lasted until 2011. The latest drought that began in 2012 just ended in 2017 following a series of winter storms that brought heavy rainfall to the state.

4.3.11 Manmade Hazards

4.3.11.1 Nature of Hazard

Manmade hazards are distinct from natural hazards in that they result directly from the actions of people. Two types of manmade hazards can be identified: technological hazards and terrorism. Technological hazards refer to incidents that can arise from human activities such as the manufacture, storage, transport, and use of hazardous materials, which include toxic chemicals, radioactive materials, and infectious substances. Technological hazards are assumed to be accidental and their consequences unintended. Terrorism, on the other hand, encompasses intentional, criminal, and malicious acts involving weapons of mass destruction (WMDs) or conventional weapons. WMDs can involve the deployment of biological, chemical, nuclear, and radiological weapons. Conventional weapons and techniques include the use of arson, incendiary explosives, armed attacks, intentional hazardous materials release, and cyber-terrorism (attack via computer).

Hazardous Materials

Technological hazards involving hazardous material releases can occur at facilities (fixed site) or along transportation routes (off-site). They can occur as a result of human carelessness, technological failure, intentional acts, and natural hazards. When caused by natural hazards, these incidents are known as secondary hazards, whereas intentional acts are terrorism. Hazardous materials releases, depending on the substance involved and type of release, can directly cause injuries and death and contaminate air, water, and soils. While the probability of a major release at any particular facility or at any point along a known transportation corridor is relatively low, the consequences of releases of these materials can be very serious.

Some hazardous materials present a radiation risk. Radiation is any form of energy propagated as rays, waves or energetic particles that travel through the air or a material medium. Radioactive materials are composed of atoms that are unstable. An unstable atom gives off its excess energy until it becomes stable. The energy emitted is radiation. The process by which an atom changes from an unstable state to a more stable state by emitting radiation is called radioactive decay or radioactivity.

Radiological materials have many uses in San Diego County including:

- by doctors to detect and treat serious diseases,
- by educational institutions and companies for research,
- by the military to power large ships and submarines.

With the shutdown of SONGS, radiological materials are no longer used to generate commercial electric power within San Diego County. However, the stored spent fuel that remains on site does pose a hazard.

Radioactive materials, if handled improperly, or radiation accidentally released into the environment, can be dangerous because of the harmful effects of certain types of radiation on the body. The longer a person is exposed to radiation and the closer the person is to the radiation, the greater the risk. Although

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radiation cannot be detected by the senses (sight, smell, etc.), it is easily detected by scientists with sophisticated instruments that can detect even the smallest levels of radiation. Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property.

Terrorism

Following a number of serious international and domestic terrorist incidents during the 1990's and early 2000's, citizens across the United States have paid increased attention to the potential for deliberate, harmful terrorist actions by individuals or groups with political, social, cultural, and religious motives. There is no single, universally accepted definition of terrorism, and it can be interpreted in a variety of ways. However, terrorism is defined in the Code of Federal Regulations as "...the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR, Section 0.85). The Federal Bureau of Investigation (FBI) further characterizes terrorism as either domestic or international, depending on the origin, base, and objectives of the terrorist organization. However, the origin of the terrorist or person causing the hazard is far less relevant to mitigation planning than the hazard itself and its consequences. Terrorists utilize a wide variety of agents and delivery systems.

4.3.11.2 Disaster History

Hazardous Material Releases

Hazardous materials can include toxic chemicals, radioactive materials, infectious substances, and hazardous wastes. The State of California defines a hazardous material as a substance that is toxic, ignitable or flammable, or reactive and/or corrosive. An extremely hazardous material is defined as a substance that shows high acute or chronic toxicity, carcinogenicity, bio-accumulative properties, persistence in the environment, or is water reactive (California Code of Regulations, Title 22). "Hazardous waste," a subset of hazardous materials, is material that is to be abandoned, discarded, or recycled, and includes chemical, radioactive, and biohazardous waste (including medical waste). An accidental hazardous material release can occur wherever hazardous materials are manufactured, stored, transported, or used. Such releases can affect nearby populations and contaminate critical or sensitive environmental areas.

Numerous facilities in San Diego County generate hazardous wastes in addition to storing and using large numbers of hazardous materials. There are a total of 12,747 sites with permits to store and maintain chemical, biological and radiological agents, and explosives in the County. Although the scale is usually small, emergencies involving the release of these substances can occur daily at both these fixed sites and on the County's streets and roadways. The major transit corridors of Interstates 5 and 805 have been the locations of the majority of incidents the Hazardous Incident Response Team (HIRT) has responded to in recent years.

Facilities that use, manufacture, or store hazardous materials in California must comply with several state and federal regulations. The Superfund Amendments and Reauthorization Act (SARA Title III), which was enacted in 1986 as a legislative response to airborne releases of methylisocyanate at Union Carbide plants in Bhopal, India and in Institute, West Virginia. SARA Title III, also known as the Emergency Planning and Community-Right-To-Know Act (EPCRA), directs businesses that handle,

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store or manufacture hazardous materials in specified amounts to develop emergency response plans and report releases of toxic chemicals. Additionally, Section 312 of Title III requires businesses to submit an annual inventory report of hazardous materials to a state-administering agency. The California legislature passed Assembly Bill 2185 in 1987, incorporating the provisions of SARA Title III into a state program. The community right-to-know requirements keep communities abreast of the presence and release of hazardous wastes at individual facilities.

Table 4.3-4 shows a breakdown by jurisdiction of facilities in the County with permits to store and maintain chemical, biological and radiological agents, and explosives. Facilities with EPA ID Numbers are facilities that generate hazardous waste.

Table 4.3-4
Licensed Hazardous Material Sites by Jurisdiction

Jurisdiction	Facilities with County Environmental Health Hazardous Material Permits	Sites with Toxic/Radiologic Hazardous Materials or Large and Complex Sites	Sites with Flammable hazardous Materials
Carlsbad	409	4	0
Chula Vista	805	5	0
Coronado	77	0	0
Del Mar	47	0	0
El Cajon	679	2	0
Encinitas	290	0	0
Escondido	790	7	0
Imperial Beach	36	0	0
La Mesa	305	1	0
Lemon Grove	111	0	0
National City	369	2	0
Oceanside	523	2	0
Poway	311	0	0
San Diego	5,458	15	2
San Marcos	431	2	0
Santee	227	1	0
Solana Beach	63	0	0
Unincorporated	1,192	9	0
Vista	522	1	0
USMCB Camp Pendleton	102	0	0
TOTAL	12,747	55	2

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Hazardous materials spills and releases in San Diego County have occurred as a result of clandestine drug manufacturing; spills from commercial, military and recreational vessels on the region's waterways; traffic accidents; sewer breaks and overflows; and various accidents/incidents related to the manufacture, use, and storage of hazardous materials by County industrial, commercial and government facilities. Although the following emergency response history for San Diego County chronicles various hazardous materials releases, the incidents do not necessarily indicate the degree of exposure to the public.

There were 504 responses to a hazardous materials release within San Diego County in 2014. Table 4.3-5 lists the numbers by jurisdiction.

Table 4.3-5
County of San Diego Environmental Health Department
Hazardous Materials Division HIRT Responses in 2014

City	Number of Hazardous Materials Releases
Carlsbad	18
Chula Vista	28
Coronado	1
Del Mar	2
El Cajon	26
Encinitas	9
Escondido	22
Imperial Beach	7
La Mesa	8
Lemon Grove	5
National City	15
Oceanside	16
Poway	8
San Diego	220
San Marcos	7
Santee	12
Solana Beach	0
Unincorporated	86
Vista	14
TOTAL RESPONSES IN 2014	504

There has not been significant exposure to the public in San Diego County due to manmade releases of chemical or biological agents, although there have been several smaller-scale incidents. Chemical spills and releases from transportation and industrial accidents have resulted in short-term chemical exposure to individuals in the vicinity of the release. San Diego beaches are routinely closed because of sewage spills and storm run-off. Bacterial levels can increase significantly in ocean and bay waters, especially near storm drain, river, and lagoon outlets, during and after rainstorms. Elevated bacterial levels may continue for a period of up to 3 days depending upon the intensity of rainfall and volume of runoff.

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Waters contaminated by urban runoff may contain human pathogens (bacteria, viruses, or protozoa) that can cause illnesses.

San Diego experienced its first significant E. coli bacteria outbreak in 10 years after patrons ate tainted food at local area restaurants in 2003. In 1992 and 1993 a similar outbreak occurred in San Diego County, which resulted in the death of a child after he ate tainted food from a Carlsbad fast-food restaurant. Additionally, in the early 1980s a hepatitis outbreak associated with poor food handling techniques resulting in the closure of a major restaurant in Mission Valley and the implementation of a food-handler certification program by the San Diego County Health Department.

The only known release of radiological agents in the County was the result of an accident at San Onofre Nuclear Generating Station (SONGS). In 1981, an accidental "ignition" of hydrogen gases in a holding tank of the San Onofre Nuclear Generating Station (SONGS) caused an explosion - which bent the bolts of an inspection hatch on the tank, allowing radioactive gases in the tank to escape into a radioactive waste room. From there, the radioactive material was released into the atmosphere. The plant was shut down for several weeks following the event (W.I.S.E. Vol.3 No.4 p.18). This incident occurred during the plant's operation of its Unit 1 generator, which has since been decommissioned. No serious injuries occurred.

On February 3, 2001 another accident occurred at SONGS when a circuit breaker fault caused a fire that resulted in a loss of offsite power. Published reports suggest that rolling blackouts during the same week in California were partially due to the shutdown of the SONGS reactors in response to the 3-hour fire. Although no radiation was released and no nuclear safety issues were involved, the federal Nuclear Regulatory Commission sent a Special Inspection Team to the plant site to investigate the accident.

Terrorism

While San Diego County has not experienced any high profile attacks by groups or individuals associated with international terrorist organizations, the region has been the site of several incidents with domestic origins. Most notable is the August 1, 2003 arson attack on a mixed-use housing and office development under construction in the University City neighborhood. The blaze, which officials estimate caused around \$50 million in damage, was allegedly set by the Earth Liberation Front, a radical environmentalist group.

San Diego has been linked to the 9-11 attacks in New York City and on the Pentagon; two of the confirmed hijackers of the commercial aircraft used in the attacks took flight school lessons while living in San Diego.

San Diego County has received numerous bomb threats to schools, government buildings, religious sites, and commercial facilities over the years. While the majority of bomb threats are hoaxes, authorities have been required to mobilize resources and activate emergency procedures on a fairly regular basis in response.

Other Manmade Disasters

On September 25th, 1978 San Diego was the scene of one of the worst air disasters in the United States. A mid-air collision between a Cessna 172 and a Pacific Southwest Airlines (PSA) Boeing 727 caused both planes to crash into the North Park neighborhood below. A total of 144 lives were lost including 7 people on the ground. More than 20 residences were damaged or destroyed.

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In 1984, a gunman opened fire in a San Ysidro McDonald's restaurant, killing 21 people. This event was not considered an act of terrorism as no political or social objectives were associated with this event.

4.3.11.3 Location and Extent/Probability of Occurrence and Magnitude

Information related to the probability and magnitude of manmade hazards is considered sensitive homeland security related information. Consequently, this information is provided in a separate confidential document (Attachment C). The potential for a man-made event is highly likely.

4.4 Vulnerability Assessment

Vulnerability describes how exposed or susceptible to damage an asset is, and depends on an asset's construction, contents and the economic value of its functions. This vulnerability analysis predicts the extent of injury and damage that may result from a hazard event of a given intensity in a given area on the existing and future built environment. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. Indirect effects can be much more widespread and damaging than direct effects. For example, damage to a major utility line could result in significant inconveniences and business disruption that would far exceed the cost of repairing the utility line.

4.4.1 Asset Inventory

Hazards that occur in San Diego County can impact critical facilities located in the County. A critical facility is defined as a facility in either the public or private sector that provides essential products and services to the general public, is otherwise necessary to preserve the welfare and quality of life in the County, or fulfills important public safety, emergency response, and/or disaster recovery functions. Figure 4.4-1 shows the critical facilities identified for the County. The critical facilities identified in San Diego County include 57 hospitals and other health care facilities; 289 emergency operations facilities, fire stations, and police stations; 1,057 schools, 3,732 hazardous material sites, 7 transportation systems that include 46 airport facilities, 1,985 bridges, 23 bus and 40 rail facilities; 68 marinas and port facilities, and 1,040 kilometers of highways; utility systems that include 21 electric power facilities, natural gas facilities, crude and refined oil facilities, 13 potable and waste water facilities, and 672 communications facilities and utilities; 56 dams, 124 government office/civic centers, jails, prisons, military facilities, religious facilities, and post offices (Figure 4.4.1).

GIS, HAZUS-MH, and other modeling tools were used to map the critical facilities in the county and to determine which would most likely be affected by each of the profiled hazards. San Diego County covers 4,264 square miles with several different climate patterns and types of terrain, which allows for several hazards to affect several different parts of the county and several jurisdictions at once or separately. The hazards addressed are described in Section 4.3.

4.4.2 Estimating Potential Exposure and Losses, and Future Development Trends

GIS modeling was used to estimate exposure to population, critical facilities, infrastructure, and residential/commercial properties, from coastal storms/erosion, tsunami, structure fire/wildfire, dam failure, landslide, and manmade hazards. The specific methods and results of all analyses are presented below. The results are shown as potential exposure in thousands of dollars, and as the worst-case scenario. For infrastructure, which has been identified as highways, railways and energy pipelines, the length of

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exposure/impact is given in kilometers. Exposure characterizes the value of structures within the hazard zone, and is shown as estimated exposure based on the overlay of the hazard on the critical facilities, infrastructure, and other structures, which are given an assumed cost of replacement for each type of structure exposed. These replacement costs are estimated using a building square footage inventory purchased from Dun and Bradstreet. The square footage information was classified based on Standard Industrial Code (SIC) and provided at a 2002 census-tract resolution. The loss or exposure value is then determined with the assumption that the given structure is totally destroyed (worst case scenario), which is not always the case in hazard events. This assumption was valuable in the planning process, so that the total potential damage value was identified when determining capabilities and mitigation measures for each jurisdiction. Table 4.4-1 provides abbreviations and average replacement costs used for critical facilities and infrastructure listed in all subsequent exposure/loss tables. Table 4.4-2 provides the total inventory and exposure estimates for the critical facilities and infrastructure by jurisdiction. Table 4.4-3 shows the estimated exposure inventory for infrastructure by jurisdiction. Table 4.4-4 provides an inventory of the maximum population and building exposure by jurisdiction.

In addition to estimating potential exposure for structures, at-risk populations were also identified per hazard area. At-risk populations were defined as low-income, disabled and/or elderly and were based upon the 2000 census information.

Loss was estimated for earthquake and flood hazards in the County, in addition to exposure. Loss is that portion of the exposure that is expected to be lost to a hazard, and is estimated by referencing frequency and severity of previous hazards. Hazard risk assessment methodologies embedded in HAZUS, FEMA's loss estimation software, were applied to earthquake and flood hazards in San Diego County. HAZUS (a loss estimation software) integrates with GIS to provide estimates for the potential impact of earthquake and flood hazards by using a common, systematic framework for evaluation. This software contains economic and structural data on infrastructure and critical facilities, including replacement value costs with 2006 square footage and valuation parameters to use in loss estimation assumptions. This approach provides estimates for the potential impact by using a common, systematic framework for evaluation. The HAZUS risk assessment methodology is parametric, in that distinct hazard and inventory parameters (e.g. ground shaking and building types) were modeled to determine the impact (damages and losses) on the built environment. The HAZUS-MH models were used to estimate losses from earthquake and flood hazards to critical facilities, infrastructure, and residential/commercial properties, as well as economic losses on several return period events and annualized levels. Loss estimates used available data, and the methodologies applied resulted in an approximation of risk. The economic loss results are presented as the Annualized Loss (AL) for the earthquake hazard. AL addresses the two key components of risk: the probability of the hazard occurring in the study area and the consequences of the hazard, largely a function of building construction type and quality, and of the intensity of the hazard event. By annualizing estimated exposure values, the AL takes into account historic patterns of frequent smaller events with infrequent but larger events to provide a balanced presentation of the risk. These estimates should be used to understand relative risk from hazards and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from approximations and simplifications that are necessary for a comprehensive analysis (such as incomplete inventories, demographics, or economic parameters).

Figure 4.4.1

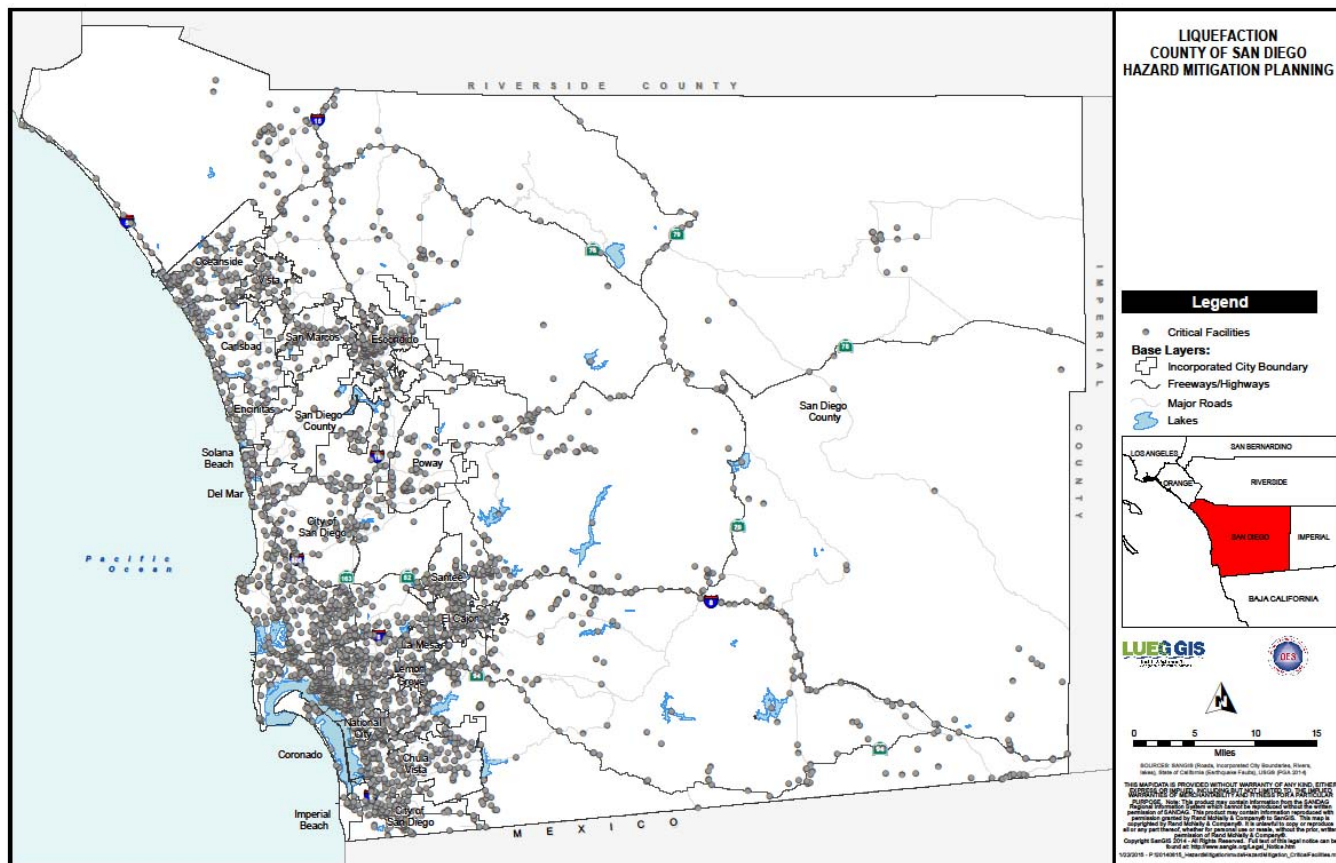


Table 4.4-1
Abbreviations and Costs Used for Critical Facilities and Infrastructure

Abr.	Name	Building Type (where applicable)	Average Replacement Cost
AIR	Airport facilities	s1l	200,000,000
BRDG	Bridges	n/a	191,600
BUS	Bus facilities	c1l	2,000,000
COM	Communication facilities and Utilities	c1l	2,000,000
ELEC	Electric Power facility	c1l	10,000,000
EMER	Emergency Centers, Fire Stations and Police Stations	c1l	2,000,000
GOVT	Government Office/Civic Center	c1l	2,000,000
HOSP	Hospitals/Care facilities	s1m	100,000,000
INFR	Kilometers of Infrastructure. Includes:		
	Oil/Gas Pipelines (OG)	n/a	300
	Railroad Tracks (RR)	n/a	860
	Highway (HWY)	n/a	3,860
PORT	Port facilities	c1l	20,000,000
POT	Potable and Waste Water facilities	c1l	100,000,000
RAIL	Rail facilities	c1l	2,000,000
SCH	Schools	rm1l	1,000,000

Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)

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Table 4.4-2
Inventory of Critical Facilities and Infrastructure and Exposure Value by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	RAIL	SCH	TOTAL
Carlsbad	Number	1	33	0	2	1	7	5	2	153	0	2	0	33	239
	Exposure (x\$1000)	200,000	6,323	0	4,000	10,000	14,000	10,000	200,000	247	0	200,000	0	33,000	677,570
Chula Vista	Number	0	44	2	2	1	13	9	7	119	1	1	0	75	274
	Exposure (x\$1000)	0	8,430	4,000	4,000	10,000	26,000	18,000	700,000	255	20,000	100,000	0	75,000	965,686
Coronado	Number	0	2	0	1	0	3	4	1	28	0	0	0	9	48
	Exposure (x\$1000)	0	383	0	2,000	0	6,000	8,000	100,000	51	0	0	0	9,000	125,434
Del Mar	Number	0	5	0	0	0	1	2	0	14	0	0	0	2	24
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	10	0	0	0	2,000	8,968
El Cajon	Number	1	37	1	2	1	8	7	6	64	0	0	0	47	174
	Exposure (x\$1000)	200,000	7,089	2,000	4,000	10,000	16,000	14,000	600,000	161	0	0	0	47,000	900,250
Encinitas	Number	0	16	0	1	0	6	3	3	85	0	1	7	25	147
	Exposure (x\$1000)	0	3,066	0	2,000	0	12,000	6,000	300,000	145	0	100,000	14,000	25,000	462,211
Escondido	Number	0	74	1	4	0	8	8	8	83	0	1	1	46	234
	Exposure (x\$1000)	0	14,178	2,000	8,000	0	16,000	16,000	800,000	211	0	100,000	2,000	46,000	1,004,389
Imperial Beach	Number	0	1	0	0	0	2	2	2	4	0	0	0	8	19
	Exposure (x\$1000)	0	192	0	0	0	4,000	4,000	200,000	2	0	0	0	8,000	216,194
La Mesa	Number	0	36	0	1	0	4	4	2	53	0	0	0	25	125
	Exposure (x\$1000)	0	6,898	0	2,000	0	8,000	8,000	200,000	113	0	0	0	25,000	250,011
Lemon Grove	Number	0	8	0	0	0	2	3	0	24	0	0	0	10	47
	Exposure (x\$1000)	0	1,533	0	0	0	4,000	6,000	0	60	0	0	0	10,000	21,593
National City	Number	0	47	1	1	2	4	4	7	37	5	1	3	20	132
	Exposure (x\$1000)	0	9,005	2,000	2,000	20,000	8,000	8,000	700,000	88	100,000	100,000	6,000	20,000	975,093
Oceanside	Number	1	43	2	4	0	10	12	11	124	0	1	8	43	259
	Exposure (x\$1000)	200,000	8,239	4,000	8,000	0	20,000	24,000	1,100,000	250	0	100,000	16,000	43,000	1,523,489
Poway	Number	0	45	1	0	0	4	2	1	34	0	0	0	25	112
	Exposure (x\$1000)	0	8,622	2,000	0	0	8,000	4,000	100,000	98	0	0	0	25,000	147,720
San Diego (City)	Number	4	498	12	33	9	89	98	50	959	62	2	5	361	2,182
	Exposure (x\$1000)	800,000	95,417	24,000	66,000	90,000	178,000	196,000	5,000,000	2,168	1,240,000	200,000	10,000	361,000	8,262,585
San Marcos	Number	0	12	0	2	0	8	3	2	59	0	0	2	28	116
	Exposure (x\$1000)	0	2,299	0	4,000	0	16,000	6,000	200,000	149	0	0	4,000	28,000	260,448
Santee	Number	0	15	1	4	0	4	3	0	33	0	1	0	15	76
	Exposure (x\$1000)	0	2,874	2,000	8,000	0	8,000	6,000	0	72	0	100,000	0	15,000	141,946
Solana Beach	Number	0	5	0	0	0	1	2	0	28	0	0	1	9	46
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	46	0	0	2,000	9,000	18,004
Unincorporated - Rural	Number	33	227	2	44	3	100	3	15	1,334	0	0	0	86	1,847
	Exposure (x\$1000)	6,600,000	43,493	4,000	88,000	30,000	200,000	6,000	1,500,000	4,402	0	0	0	86,000	8,561,895
Unincorporated - Urban Core	Number	0	117	0	12	0	40	7	10	320.3	0	1	2	115	624
	Exposure (x\$1000)	0	22417.2	0	24000	0	80000	14000	1000000	597.25	0	100000	4000	115000	1,360,014
Vista	Number	0	12	0	0	0	9	4	3	53	0	0	10	40	131
	Exposure (x\$1000)	0	2,299	0	0	0	18,000	8,000	300,000	101	0	0	20,000	40,000	388,400
Total Number		40	1,277	23	113	17	323	185	130	12,749	68	11	39	1,022	15,997
Total Exposure (x\$1000)		8,000,000	244,673	46,000	226,000	170,000	646,000	370,000	13,000,000	42,540	1,360,000	1,100,000	78,000	1,022,000	26,305,213

**Table 4.4-3
Inventory of Exposure for Infrastructure**

Jurisdiction	Data	HWY	Replacen	RR	Total
Carlsbad	Number	55	87	11	153
	Exposure (x\$1000)	212	26	9	247
Chula Vista	Number	61	52	6	119
	Exposure (x\$1000)	234	15	6	255
Coronado	Number	12	16	0	28
	Exposure (x\$1000)	46	5	0	51
Del Mar	Number	1	8	5	14
	Exposure (x\$1000)	3	3	4	10
El Cajon	Number	39	19	7	64
	Oil/Gas Pipelines	150	6	6	161
Encinitas	Railroad Tracks	32	43	10	85
	Exposure (x\$1000)	124	13	8	145
Escondido	Number	52	27	3	83
	Exposure (x\$1000)	200	8	3	211
Imperial Beach	Number	0	4	0	4
	Exposure (x\$1000)	1	1	0	2
La Mesa	Number	26	16	12	53
	Exposure (x\$1000)	99	5	10	113
Lemon Grove	Number	14	6	4	24
	Exposure (x\$1000)	54	2	4	60
National City	Number	21	12	4	37
	Exposure (x\$1000)	81	4	4	88
Oceanside	Number	57	49	18	124
	Exposure (x\$1000)	220	15	15	250
Poway	Number	25	9	0	34
	Exposure (x\$1000)	95	3	0	98
San Diego (City)	Number	514	354	92	959
	Exposure (x\$1000)	1,983	106	79	2,168
San Marcos	Number	35	15	9	59
	Exposure (x\$1000)	136	4	8	149
Santee	Number	17	15	1	33
	Exposure (x\$1000)	67	4	1	72
Solana Beach	Number	10	15	3	28
	Exposure (x\$1000)	40	4	2	46
Unincorporated - Rural	Number	1,107	117	110	1,334
	Exposure (x\$1000)	4,272	35	94	4,402
Unincorporated - Urban Core	Number	136	152	33	320
	Exposure (x\$1000)	523	46	28	597
Vista	Number	23	24	7	53
	Exposure (x\$1000)	88	7	6	101
Total Number		10,777	1,352	620	12,749
Total Exposure (x\$1000)		41,601	405	533	42,540

Table 4.4-4
Inventory of the Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	104,707	43,723	\$12,308,025	1,559	\$6,986,970
Chula Vista	232,095	77,457	\$21,804,146	2,184	\$9,788,033
Coronado	23,009	9,541	\$2,685,792	470	\$2,106,399
Del Mar	4,591	2,537	\$714,166	220	\$985,974
El Cajon	98,205	35,656	\$10,037,164	1,360	\$6,095,112
Encinitas	64,145	24,848	\$6,994,712	1,268	\$5,682,796
Escondido	143,071	47,044	\$13,242,886	1,835	\$8,223,920
Imperial Beach	28,243	9,859	\$2,775,309	346	\$1,550,668
La Mesa	56,880	25,333	\$7,131,240	952	\$4,266,578
Lemon Grove	25,650	8,824	\$2,483,956	365	\$1,635,821
National City	56,522	15,776	\$4,440,944	892	\$3,997,676
Oceanside	179,626	64,642	\$18,196,723	1,964	\$8,802,059
Poway	51,126	16,339	\$4,599,429	732	\$3,280,604
San Diego (City)	1,354,013	510,740	\$143,773,310	18,862	\$84,533,825
San Marcos	83,149	27,726	\$7,804,869	812	\$3,639,140
Santee	56,848	19,681	\$5,540,202	582	\$2,608,349
Solana Beach	13,547	6,512	\$1,833,128	322	\$1,443,107
Unincorporated - Rural	168,254	60,561	\$17,047,922	2,177	\$9,756,661
Unincorporated - Urban Core	333,626	108,042	\$30,413,823	3,560	\$15,954,852
Vista	96,100	30,707	\$8,644,021	1,163	\$5,212,217
Total	3,173,407	1,145,548	\$322,471,762	41,625	\$186,550,763

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4.4.2.1 Coastal Storm/Erosion

FEMA FIRM flood hazard data compiled and digitized in 1997 was used to profile the coastal storm/erosion hazard. Specifically, the FEMA FIRM VE zone was used in the hazard modeling process in HAZUS-MH. As discussed earlier, the VE Zone is defined by FEMA as the coastal area subject to a velocity hazard (wave action). The identified vulnerable assets were superimposed on the identified hazard areas, resulting in three risk/exposure estimates: 1) the aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies, 2) lifeline infrastructure and 3) the critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

Table 4.4-5 provides a breakdown of potential coastal storm/coastal erosion exposure by jurisdiction. No losses to critical facilities and infrastructure are expected from these hazards. Approximately 4,600 people may be at risk from coastal storm/coastal erosion hazards in San Diego County. In addition, special populations at risk that may be impacted by coastal storm/coastal erosion in San Diego County include: 331 low-income households and 813 elderly persons.

Table 4.4-5
Potential Exposure from Coastal Storm/Erosion Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	14	8	\$2,252	0	\$0
Chula Vista	0	0	\$0	0	\$0
Coronado	580	261	\$73,472	1	\$4,482
Del Mar	17	10	\$2,815	0	\$0
El Cajon	0	0	\$0	0	\$0
Encinitas	94	42	\$11,823	0	\$0
Escondido	0	0	\$0	0	\$0
Imperial Beach	157	64	\$18,016	0	\$0
La Mesa	0	0	\$0	0	\$0
Lemon Grove	0	0	\$0	0	\$0
National City	0	0	\$0	0	\$0
Oceanside	76	54	\$15,201	3	\$13,445
Poway	0	0	\$0	0	\$0
San Diego (City)	199	128	\$36,032	1	\$4,482
San Marcos	0	0	\$0	0	\$0
Santee	0	0	\$0	0	\$0
Solana Beach	402	167	\$47,011	2	\$8,963
Unincorporated - Rural	0	0	\$0	0	\$0
Unincorporated - Urban Core	0	0	\$0	0	\$0
Vista	0	0	\$0	0	\$0
Total	1,539	734	\$206,621	7	\$31,372

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4.4.2.2 *Tsunami*

Tsunami maximum run-up projections were modeled for the entire San Diego County coastline in 2000 by the University of Southern California, and distributed by the CA Office of Emergency Services. The model was a result of a combination of inundation modeling and onsite surveys to show maximum predicted inundation levels due to tsunami. This was a scenario model, which uses a given earthquake intensity and location to determine resulting tsunami effects. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates: 1) the aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies, 2) the aggregated population at risk at the census block level, and 3) the critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

Table 4.4-6 provides a breakdown of potential exposure by jurisdiction, and Table 4.4-7 provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction. Approximately 37,000 people may be at risk from the tsunami hazard in San Diego County. In addition, special populations at risk that may be impacted by tsunami in San Diego County include: 2,558 low income households and 3,655 elderly persons.

Table 4.4-6
Potential Exposure from Tsunami Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	1,165	535	\$150,603	23	\$103,079
Chula Vista	83	26	\$7,319	1	\$4,482
Coronado	8,523	3,367	\$947,811	98	\$439,207
Del Mar	1,023	542	\$152,573	35	\$156,860
El Cajon	0	0	\$0	0	\$0
Encinitas	388	178	\$50,107	9	\$40,335
Escondido	0	0	\$0	0	\$0
Imperial Beach	5,225	2,138	\$601,847	97	\$434,725
La Mesa	0	0	\$0	0	\$0
Lemon Grove	0	0	\$0	0	\$0
National City	1,306	0	\$0	5	\$22,409
Oceanside	2,108	1,059	\$298,109	46	\$206,158
Poway	0	0	\$0	0	\$0
San Diego (City)	10,294	6,490	\$1,826,935	393	\$1,761,308
San Marcos	0	0	\$0	0	\$0
Santee	0	0	\$0	0	\$0
Solana Beach	324	135	\$38,003	3	\$13,445
Unincorporated - Rural	5,154	95	\$26,743	0	\$0
Unincorporated - Urban Core	35	11	\$3,097	1	\$4,482
Vista	0	0	\$0	0	\$0
Total	35,628	14,576	\$4,103,144	711	\$3,186,489

Table 4.4-7
Potential Exposure to Critical Facilities and Infrastructure from Tsunami Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	2	0	0	0	0	0	0	4	0	0	0	0	0	6
	Exposure (x\$1000)	0	383	0	0	0	0	0	0	3	0	0	0	0	0	386
Chula Vista	Number	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	0	20,000	0	0	0	0	20,192
Coronado	Number	0	1	0	0	0	1	2	0	18	0	0	0	0	1	23
	Exposure (x\$1000)	0	192	0	0	0	2,000	4,000	0	36	0	0	0	0	1,000	7,227
Del Mar	Number	0	2	0	0	0	1	0	0	3	0	0	0	0	0	6
	Exposure (x\$1000)	0	383	0	0	0	2,000	0	0	2	0	0	0	0	0	2,385
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	1	0	0	0	0	0	0	3	0	1	0	0	0	5
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	1	0	100,000	0	0	0	100,193
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperial Beach	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	0	1,000	1,001
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	2	0	0	0	0	0	0	0	3	0	0	0	0	5
	Exposure (x\$1000)	0	383	0	0	0	0	0	0	1	60,000	0	0	0	0	60,384
Oceanside	Number	0	3	0	0	0	0	0	0	2	0	0	0	0	0	5
	Exposure (x\$1000)	0	575	0	0	0	0	0	0	3	0	0	0	0	0	578
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	7	0	0	0	0	1	1	10	49	0	0	0	0	68
	Exposure (x\$1000)	0	1,341	0	0	0	0	2,000	100,000	5	980,000	0	0	0	0	1,083,347
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	0	4	0	0	0	0	0	0	1	0	0	0	0	0	5
	Exposure (x\$1000)	0	766	0	0	0	0	0	0	1	0	0	0	0	0	768
Unincorporated Urban Core	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number		0	23	0	0	0	2	3	1	42	53	1	0	0	2	127
Total Exposure (x\$1000)		0	4,407	0	0	0	4,000	6,000	100,000	55	1,060,000	100,000	0	0	2,000	1,276,462

Refer to Table 4.4-1 for abbreviation definition

SECTION FOUR

Risk Assessment

4.4.2.3 Dam Failure

Dam inundation zones, compiled by FEMA or the National Inventory of Dams throughout San Diego County, and purchased through SanGIS, show areas that would be flooded if each dam failed. The San Diego County Water Authority provided the San Vicente Dam and Olivenhain Dam inundation maps. Olivenhain Dam is the newest dam in San Diego County, and had not yet been filled at the time of preparation of this report. Inundation areas for Olivenhain Dam however were identified and modeled as high risk. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates: 1) the aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies, 2) the aggregated population at risk at the census block level, and 3) the critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

Table 4.4-8 provides a breakdown of potential exposure by jurisdiction, and Table 4.4-9 provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction. Approximately 368,000 people are at risk from the dam failure hazard. In addition, special populations at risk that may be impacted by the dam failure hazard in San Diego County include 13,689 low-income households and 24,316 elderly persons.

Table 4.4.8
Potential Exposure from Dam Failure Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	4,113	1,951	\$549,207	49	\$219,603
Chula Vista	8,635	2,973	\$836,900	190	\$851,523
Coronado	0	0	\$0	0	\$0
Del Mar	1,139	612	\$172,278	47	\$210,640
El Cajon	0	0	\$0	0	\$0
Encinitas	1,204	425	\$119,638	35	\$156,860
Escondido	47,700	14,323	\$4,031,925	766	\$3,432,982
Imperial Beach	5,526	1,880	\$529,220	42	\$188,231
La Mesa	1,701	731	\$205,777	19	\$85,152
Lemon Grove	0	0	\$0	0	\$0
National City	1,998	496	\$139,624	184	\$824,633
Oceanside	33,755	11,437	\$3,219,516	285	\$1,277,285
Poway	47	16	\$4,504	1	\$4,482
San Diego (City)	75,686	28,036	\$7,892,134	1,206	\$5,404,930
San Marcos	2,481	829	\$233,364	59	\$264,420
Santee	20,815	6,968	\$1,961,492	267	\$1,196,614
Solana Beach	40	17	\$4,786	2	\$8,963
Unincorporated - Rural	14,512	3,686	\$1,037,609	135	\$605,030
Unincorporated - Urban Core	21,862	7,304	\$2,056,076	277	\$1,241,431
Vista	553	215	\$60,523	16	\$71,707
Total	241,767	81,899	\$23,054,569	3,580	\$16,044,486

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

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Risk Assessment

**Table 4.4-9
Potential Exposure to Critical Facilities and Infrastructure
from Dam Failure Hazard by Jurisdiction**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	4	0	0	0	0	0	0	7	0	0	0	0	1	12
	Exposure (x\$1000)	0	766	0	0	0	0	0	0	9	0	0	0	0	1,000	1,775
Chula Vista	Number	0	16	0	0	1	1	1	2	23	0	0	0	0	1	45
	Exposure (x\$1000)	0	3,066	0	0	10,000	2,000	2,000	200,000	60	0	0	0	0	1,000	218,126
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	3	0	0	0	1	0	0	9	0	0	0	0	0	13
	Exposure (x\$1000)	0	575	0	0	0	2,000	0	0	5	0	0	0	0	0	2,579
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	5	0	0	0	0	0	0	19	0	1	0	0	3	28
	Exposure (x\$1000)	0	958	0	0	0	0	0	0	13	0	100,000	0	0	3,000	103,971
Escondido	Number	0	33	1	1	0	4	8	6	48	0	0	1	1	15	118
	Exposure (x\$1000)	0	6,323	2,000	2,000	0	8,000	16,000	600,000	149	0	0	100,000	2,000	15,000	751,472
Imperial Beach	Number	0	1	0	0	0	0	1	0	3	0	0	0	0	1	6
	Exposure (x\$1000)	0	192	0	0	0	0	2,000	0	1	0	0	0	0	1,000	3,192
La Mesa	Number	0	2	0	0	0	0	0	0	9	0	0	0	0	0	11
	Exposure (x\$1000)	0	383	0	0	0	0	0	0	12	0	0	0	0	0	395
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	26	0	0	0	0	1	0	22	1	0	0	1	2	53
	Exposure (x\$1000)	0	4,982	0	0	0	0	2,000	0	63	20,000	0	0	2,000	2,000	31,044
Oceanside	Number	1	17	0	1	0	3	2	0	25	0	0	0	0	7	56
	Exposure (x\$1000)	200,000	3,257	0	2,000	0	6,000	4,000	0	62	0	0	0	0	7,000	222,319
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	120	0	1	1	8	12	2	286	0	1	0	1	12	444
	Exposure (x\$1000)	0	22,992	0	2,000	10,000	16,000	24,000	200,000	605	0	100,000	0	2,000	12,000	389,597
San Marcos	Number	0	1	0	0	0	0	0	0	3	0	0	0	0	2	6
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	4	0	0	0	0	2,000	2,196
Santee	Number	0	12	1	3	0	4	2	0	67	0	1	0	0	6	96
	Exposure (x\$1000)	0	2,299	2,000	6,000	0	8,000	4,000	0	130	0	100,000	0	0	6,000	128,429
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	1	42	0	1	0	5	0	0	68	0	0	1	0	5	123
	Exposure (x\$1000)	200,000	8,047	0	2,000	0	10,000	0	0	211	0	0	100,000	0	5,000	325,258
Unincorporated Urban Core	Number	0	22	0	0	0	6	2	2	76	0	0	0	0	15	123
	Exposure (x\$1000)	0	4,215	0	0	0	12,000	4,000	200,000	140	0	0	0	0	15,000	235,356
Vista	Number	0	2	0	0	0	1	0	0	1	0	0	0	0	0	4
	Exposure (x\$1000)	0	383	0	0	0	2,000	0	0	0	0	0	0	0	0	2,384
Total Number		2	306	2	7	2	33	29	12	664	1	3	2	3	70	1,136
Total Exposure (x\$1000)		400,000	58,630	4,000	14,000	20,000	66,000	58,000	1,200,000	1,465	20,000	300,000	200,000	6,000	70,000	2,418,094

Refer to Table 4.4-1 for abbreviation definition

SECTION FOUR

Risk Assessment

4.4.2.4 Earthquake, Liquefaction and Earthquake-Induced Landslides

The data used in the earthquake hazard assessment were: 100-, 250-, 500-, 750-, 1000-, 1500-, 2000-, and 2500- year return period USGS probabilistic hazards. Soil conditions for San Diego County as developed by USGS were also used, which allowed for a better reflection of amplification of ground shaking that may occur. The HAZUS software model, which was developed for FEMA by the National Institute of Building Services as a tool to determine earthquake loss estimates, was used to model earthquake and flood for this assessment. This software program integrates with a GIS to facilitate the manipulation of data on building stock, population, and the regional economy with hazard models. PBS&J updated this model in 2003 to HAZUS-MH (Multiple Hazard), which can model earthquake and flood, along with collateral issues associated with each model, such as liquefaction and landslide with earthquakes. This software was not released prior to the beginning of the planning process; however, PBS&J performed vulnerability and loss estimation models for earthquakes and flood for this project using the newer model.

Additionally, the earthquake risk assessment explored the potential for collateral hazards such as liquefaction and earthquake-induced landslides. Three cases were examined, one case with shaking only, a second case with liquefaction potential, and a third with earthquake-induced landslides. Once the model was complete, the identified vulnerable assets were superimposed on top of this information, resulting in three risk/loss estimates: 1) the aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies, 2) the aggregated population at risk at the census block level, and 3) the critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction. Results for residential and commercial properties were generated as annualized losses, which average all eight of the modeled return periods (100-year through 2500-year events). For critical facility losses it was helpful to look at 100- and 500-year return periods to plan for an event that is more likely to occur in the near-term. In the near term, a 500-year earthquake would cause increased shaking, liquefaction and landslide, which would be expected to increase loss numbers. Exposure for annualized earthquake included buildings and population in the entire county because a severe or worst case scenario earthquake could affect any structure in the County. Furthermore, the annualized earthquake loss table also shows potential collateral exposure and losses from liquefaction and landslide separately; this is the additional loss from earthquake due to liquefaction or landslide caused by earthquakes and should be added to the shaking-only loss values to get the correct value. (The collateral liquefaction and landslide loss results for critical facilities were included with earthquake in Tables 4.4-11 and 4.4-12, to plan for an event that is more likely to occur in the near-term as discussed above).

Table 4.4-10 provides a breakdown of potential exposure and losses due to annualized earthquake events by jurisdiction. Tables 4.4-11 and 4.4-12 provide a breakdown of infrastructure and critical facility losses from 100-year and 500-year earthquakes, respectively. Approximately 2,800,000 people may be at risk from the annualized earthquake and earthquake-induced liquefaction hazards. In addition, special populations at risk that may be impacted by the earthquake hazard in San Diego County include 13,689 low-income households and 24,316 elderly persons.

Table 4.4-10
Potential Exposure and Losses from Annualized Earthquake Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk					Commercial Buildings at Risk				
		Building Count	**Potential Loss from Shaking (x\$1000)	**Potential Additional Loss from Liquefaction (x\$1000)	**Potential Additional Loss from Landslide (x\$1000)	Potential Exposure (x\$1000)	Building Count	**Potential Loss from Shaking (x\$1000)	**Potential Additional Loss from Liquefaction (x\$1000)	**Potential Additional Loss from Landslide (x\$1000)	Potential Exposure (x\$1000)
Carlsbad	104,707	43,723	2,649	0	524	12,308,025	1,559	998	0	352	6,986,970
Chula Vista	232,095	77,457	3,086	332	586	21,804,146	2,184	772	50	262	9,788,033
Coronado	23,009	9,541	1,309	156	208	2,685,792	470	224	0	75	2,106,399
Del Mar	4,591	2,537	235	0	46	714,166	220	110	0	27	985,974
El Cajon	98,205	35,656	1,739	0	319	10,037,164	1,360	726	0	218	6,095,112
Encinitas	64,145	24,848	1,962	0	536	6,994,712	1,268	659	0	209	5,682,796
Escondido	143,071	47,044	2,743	0	399	13,242,886	1,835	1,149	0	339	8,223,920
Imperial Beach	28,243	9,859	680	149	94	2,775,309	346	87	8	34	1,550,668
La Mesa	56,880	25,333	1,026	0	121	7,131,240	952	318	0	82	4,266,578
Lemon Grove	25,650	8,824	454	0	56	2,483,956	365	95	0	32	1,635,821
National City	56,522	15,776	874	56	203	4,440,944	892	420	0	132	3,997,676
Oceanside	179,626	64,642	4,336	646	1,156	18,196,723	1,964	849	34	293	8,802,059
Poway	51,126	16,339	776	0	141	4,599,429	732	257	0	82	3,280,604
San Diego (City)	1,354,013	510,740	32,046	1,648	8,721	143,773,310	18,862	12,428	725	4,231	84,533,825
San Marcos	83,149	27,726	934	0	113	7,804,869	812	518	0	153	3,639,140
Santee	56,848	19,681	1,076	0	279	5,540,202	582	252	0	108	2,608,349
Solana Beach	13,547	6,512	573	62	108	1,833,128	322	312	15	84	1,443,107
Unincorporated-Rural	168,254	60,561	886	0	152	17,047,922	2,177	149	0	43	9,756,661
Unincorporated-Urban Core	333,626	108,042	8,963	1	2,113	30,413,823	3,560	1,123	0	329	15,954,852
Vista	96,100	30,707	1,597	0	251	8,644,021	1,163	411	0	116	5,212,217
Total	3,173,407	1,145,548	\$67,943	\$3,050	\$16,126	\$322,471,762	\$41,625	\$21,860	\$832	\$7,202	\$186,550,763

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Risk Assessment

Table 4.4-11
Potential Exposure to Critical Facilities and Infrastructure from 100-Year Earthquake Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	TOTAL
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated - Rural	Number	15	30	1	19	0	26	0	8	437	0	0	1	0	28	565
	Exposure (x\$1000)	3,000,000	5,748	2,000	38,000	0	52,000	0	800,000	1,647	0	0	100,000	0	28,000	4,027,395
Unincorporated - Urban Core	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number		15	30	1	19	0	26	0	8	437	0	0	1	0	28	565
Total Exposure (x\$1000)		3,000,000	5,748	2,000	38,000	0	52,000	0	800,000	1,647	0	0	100,000	0	28,000	4,027,395

Table 4.4-12
Potential Exposure to Critical Facilities and Infrastructure from 500-Year Earthquake Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	TOTAL
Carlsbad	Number	1	33	0	2	1	7	5	2	153	0	2	0	0	33	239
	Exposure (x\$1000)	200,000	6,323	0	4,000	10,000	14,000	10,000	200,000	247	0	200,000	0	0	33,000	677,570
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coronado	Number	0	1	0	1	0	2	4	1	19	0	0	0	0	9	37
	Exposure (x\$1000)	0	192	0	2,000	0	4,000	8,000	100,000	30	0	0	0	0	9,000	123,222
Del Mar	Number	0	5	0	0	0	1	2	0	14	0	0	0	0	2	24
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	10	0	0	0	0	2,000	8,968
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	16	0	1	0	6	3	3	85	0	1	0	7	25	147
	Exposure (x\$1000)	0	3,066	0	2,000	0	12,000	6,000	300,000	145	0	100,000	0	14,000	25,000	462,211
Escondido	Number	0	71	1	4	0	8	8	8	83	0	1	1	1	46	232
	Exposure (x\$1000)	0	13,604	2,000	8,000	0	16,000	16,000	800,000	211	0	100,000	100,000	2,000	46,000	1,103,815
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanside	Number	1	43	2	4	0	10	12	11	124	0	1	0	8	43	259
	Exposure (x\$1000)	200,000	8,239	4,000	8,000	0	20,000	24,000	1,100,000	250	0	100,000	0	16,000	43,000	1,523,489
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	2	115	3	15	4	24	35	4	239	47	1	0	5	68	562
	Exposure (x\$1000)	400,000	22,034	6,000	30,000	40,000	48,000	70,000	400,000	421	940,000	100,000	0	10,000	68,000	2,134,455
San Marcos	Number	0	12	0	2	0	8	3	2	59	0	0	0	2	28	116
	Exposure (x\$1000)	0	2,299	0	4,000	0	16,000	6,000	200,000	149	0	0	0	4,000	28,000	260,448
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solana Beach	Number	0	5	0	0	0	1	2	0	28	0	0	0	1	9	46
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	47	0	0	0	2,000	9,000	18,005
Unincorporated - Rural	Number	30	188	2	31	2	76	1	12	1,145	0	0	4	0	63	1,554
	Exposure (x\$1000)	6,000,000	36,021	4,000	62,000	20,000	152,000	2,000	1,200,000	3,818	0	0	400,000	0	63,000	7,942,838
Unincorporated - Urban Core	Number	0	39	0	9	0	20	3	6	165	0	1	0	2	45	290
	Exposure (x\$1000)	0	7472.4	0	18000	0	40000	6000	600000	252	0	100000	0	4000	45000	820,725
Vista	Number	0	12	0	0	0	9	4	3	53	0	0	0	10	40	131
	Exposure (x\$1000)	0	2,299	0	0	0	18,000	8,000	300,000	101	0	0	0	20,000	40,000	388,400
Total Number		34	540	8	69	7	172	82	52	2,167	47	7	5	36	411	3,637
Total Exposure (x\$1000)		6,800,000	103,464	16,000	138,000	70,000	344,000	164,000	5,200,000	5,681	940,000	700,000	500,000	72,000	411,000	15,464,145

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4.4.2.5 Flood

Digitized 100-year and 500-year flood maps with base flood elevation (BFE) from the FEMA FIRM program for most of the areas were utilized for this project. Census blocks with non-zero population and non-zero dollar exposure that intersect with these polygons were used in the analysis. For the areas that did not include BFE information, a base flood elevation was estimated for the final purpose of computing the flood depth at different locations of the region as follows:

- Transect lines across the flood polygon (perpendicular to the flow direction) were created using an approximation method for Zone A flood polygons. Zone A is the FEMA FIRM Zone that is defined as the 100-year base flood.
- A point file was extracted from the line (Begin node, End node and center point). The Zonal operation in the GIS tool Spatial Analyst (with the point file and a digital elevation model [DEM]) was used to estimate the ground elevation in the intersection of the line with the flood polygon borders. The average value of the End and Begin point of the line was calculated. This value was assumed as the base flood elevation for each transect.

A surface model (triangulated irregular network, or TIN) was derived from the original transect with the derived BFE value and the flood polygon. This TIN file approximated a continuous and variable flood elevation along the flood polygon. A grid file was then derived from the TIN file with the same extent and pixel resolution of the DEM (30-meter resolution). The difference of the flood elevation grid file and the DEM was calculated to produce an approximate flood depth for the whole study area. HAZUS-MH based damage functions, in a raster format, were created for each of the occupancies present in the census blocks. A customized Visual Basic (VBA) script was written to assign the ratio of damage expected (function of computed flood depth) for each type of occupancy based on the HAZUS-MH damage functions. HAZUS-MH exposure values (\$) in raster format were created using Spatial Analyst. Since not all areas in the census blocks are completely within the flood area, the exposure at risk was weighted and estimated accordingly based on the number of pixels in flood area. Losses were then estimated through multiplication of damage ratio with the exposure at risk for each block. Losses were then approximated based on 100- and 500-year losses (high and low hazards).

Table 4.4-13 provides a breakdown of potential exposure and losses by jurisdiction for 100-year flood, and Table 4.4-14 provides a breakdown of infrastructure and critical facility losses for 100-year flood by jurisdiction. Table 4.4-15 provides a breakdown of potential exposure and losses by jurisdiction from 500-year flood, and Table 4.4-16 provides a breakdown of potential infrastructure and critical facility losses by jurisdiction. The loss tables also provide a breakdown of loss ratios for commercial and residential properties by jurisdiction. These loss ratios are determined by dividing the loss values by the exposure values for each jurisdiction, and give a perspective of the potential losses for each jurisdiction for this hazard. For example, a loss ratio value of 0.4 in El Cajon would mean that 40% of the exposed buildings in El Cajon would be lost due to a 100- or 500-year flood.

Approximately 134,000 people may be at risk from the 100-year flood hazard. In addition, special populations at risk that may be impacted by the 100-year flood hazard in San Diego County include 8,424 low-income households and 15,144 elderly persons. Approximately 215,000 people are at risk from the 500-year flood hazard. In addition, special populations at risk that may be impacted by the 500-year flood hazard in San Diego County include 13,689 low-income households and 24,316 elderly persons.

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4.4.2.5.1 Participation in the National Flood Insurance Program

Most jurisdictions within San Diego County participate in the National Flood Insurance program. Specific details for each participating jurisdiction are listed below.

City of Carlsbad

The City of Carlsbad has participated in the National Flood Insurance Program since 1974. Participation in the NFIP allows FEMA to authorize the sale of flood insurance (up to program limits) for businesses and residents within the appropriate flood risk zones. FEMA provides Flood Insurance Rate Maps (FIRM) delineating base flood elevations and flood risk zones and provides requirements to be adopted by the City. Their maps were updated in 2012.

City of Chula Vista

The City of Chula Vista participates in the National Flood Insurance Program, allowing FEMA to authorize the sale of flood insurance (up to program limits) for businesses and residents within the appropriate flood risk zones. FEMA provides Flood Insurance Rate Maps delineating base flood elevations and flood risk zones and provides requirements to be adopted by the City. The Chula Vista Municipal Code has been amended to include the language required by FEMA.

City of Coronado

The City of Coronado participates in the National Flood Insurance Program, allowing FEMA to authorize the sale of flood insurance (up to program limits) for businesses and residents within the appropriate flood risk zones. FEMA provides Flood Insurance Rate Maps (FIRM) delineating base flood elevations and flood risk zones and provides requirements to be adopted by the City.

City of Del Mar

The City of Del Mar participates in the National Flood Insurance Program, allowing FEMA to authorize the sale of flood insurance (up to program limits) for businesses and residents within the appropriate flood risk zones. FEMA provides Flood Insurance Rate Maps (FIRM) identifying base flood elevations and flood risk zones and provides requirements. All FEMA requirements have been adopted by the City.

City of El Cajon

The City of El Cajon is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the City and as designated by FEMA. The City of El Cajon manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas.

City of Encinitas

Encinitas participates in the National Flood Insurance Program (NFIP) and is required to adopt and enforce floodplain ordinances that meet FEMA's requirements. In return the NFIP makes federally backed flood insurance available in areas that are prone to flooding (have at least 1% chance of flooding annually). Without Federally backed insurance for flooding, homeowners either can't find flood insurance or the rate is very high. The NFIP is a Federal program administered by FEMA that provides flood insurance, floodplain management, and flood hazard mapping. The City of Encinitas Engineering Department

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manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to address questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Encinitas received updated maps last year. Any proposed changes to these maps are processed by the City through FEMA. The Floodplain Management Regulations in Chapter 23.40 of the Encinitas Municipal Code meet or exceed FEMA guidelines and requirements.

City of Escondido

The City of Escondido does not participate in the National Flood Insurance Program (NFIP). As part of their property insurance policy the City does purchase flood coverage. The City has a \$30,000,000 limit with a deductible of either \$250,000 or \$100,000 depending upon the specific flood zone.

City of Imperial Beach

The City of Imperial Beach participates in the NFIP. The staff member with the key role in the program is the Floodplain Administrator. The Administrator determines if a proposed structure would be situated within an area of special flood hazard (usually a 100-year floodplain or floodway) as shown on the FEMA Flood Insurance Rate Map (FIRM). They are usually along the oceanfront, bay-front, or river valley. It is rare if the City receives a building permit application to build within a floodplain. When that occurs, the Administrator requires the finish floor elevation to be above the base flood elevation. In addition there would be a requirement for the applicant's engineer to submit a hydrology study that would show the proposed structure would not raise the base flood elevation. The requirements in the City of Imperial beach follow the rules, regulations and guidelines of the National Flood Insurance Program.

City of La Mesa

The City of La Mesa is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the City and as designated by FEMA. The City of La Mesa manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas.

City of Lemon Grove

The City of Lemon Grove is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the City and as designated by FEMA. The City of Lemon Grove manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas.

City of National City

The City of National City is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by FEMA. The City of National City manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements, State of

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California Department of Water Resources Model Floodplain. Management Ordinance and the City of National City Floodplain Ordinance, and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Any proposed changes to these maps are processed by the City through FEMA.

City of Oceanside

The City of Oceanside participates in FEMA's National Flood Insurance Program. The program is monitored through our City Engineering Department which manages the permitting of developments and improvements in the floodplain areas. These areas are identified by Flood Maps that are updated by FEMA. The City has been part of this program since 1991 with our last assessment in 1996.

City of Poway

The City of Poway participates in the National Flood insurance Program (NFIP). Participation in the NFIP is required to provide our citizens with Federally-subsidized flood insurance. The City's responsibility, as a NFIP participant, is to adopt a floodplain ordinance regulate development in the 100 year floodplain. Any development in the floodplain requires a Floodplain Development permit issued by the City. They estimate there are over 900 residential structures located in the 100-year floodplain. The City of Poway also participates in the Community Rating System (CRS) program which provides our citizens with a 10% reduction in their flood insurance premiums. The amount of reduction is based on our floodplain management activities that are over and above the minimum required by FEMA.

City of San Diego

The City of San Diego is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by FEMA. The City of San Diego manages the permitting of any proposed developments and improvements within the floodplain areas per the FEMA guidelines and requirements and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Any proposed changes to these maps are processed by the City through FEMA.

City of San Marcos

The City of San Marcos is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by FEMA. The City of San Marcos has adopted a floodplain management ordinance in accordance with the FEMA's rules and regulations. The City manages the permitting of any proposed developments and improvements within the floodplain areas per the guidelines and requirements provided in said ordinance and keeps up to date copies of the Flood Insurance Rate Maps (FIRM). These maps are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Any proposed changes to these maps are processed by the City through FEMA.

City of Santee

The City of Santee is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by

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FEMA. The City of Santee manages the permitting of any proposed developments and improvements within the floodplain areas per the City's Flood Damage Prevention Ordinance that meets or exceeds FEMA guidelines and requirements. The City of Santee keeps up to date copies of the Flood Insurance Rate Maps (FIRM) that are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Any proposed changes to these maps are processed by the City through FEMA.

City of Solana Beach

The City of Solana Beach is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by FEMA. The City also has a Municipal Code (Chapter 17.80; FLOOD DAMAGE PREVENTION OVERLAY ZONE). This ordinance references the Federal Flood Insurance Rate Maps. The City of Solana Beach is currently working with FEMA to ensure their program remains current.

City of Vista

The City of Vista is a participant in FEMA's National Flood Insurance Program (NFIP). This program provides flood insurance for structures located within the floodplain areas in the city and as designated by FEMA. The City of Vista manages the permitting of any proposed developments and improvements within the floodplain areas per the City's Flood Damage Prevention Ordinance that meets or exceeds FEMA guidelines and requirements. The City of Vista keeps up to date copies of the Flood Insurance Rate Maps (FIRM) that are used to assist constituents in answering their questions regarding the 100-year flood elevations and boundaries within the floodplain areas. Any proposed changes to these maps are processed by the City through FEMA.

County of San Diego

The County of San Diego participates in the National Flood Insurance Program (NFIP) managed by the Federal Emergency Management Agency (FEMA). To qualify for flood insurance, new construction and substantial improvement to structures located in the Special Flood Hazard Area (SFHA) within the County must meet minimum standards established by the NFIP. Additionally, FEMA's Community Rating System (CRS) program enables communities to earn credits for tasks and activities above and beyond minimum NFIP standards. The County has been a participating member under the CRS since September 2007, and has twice successfully reduced insurance premiums in San Diego by five percent. To ensure that the County's Flood Damage Prevention Ordinance reflects the most current standards set forth by the NFIP and to implement higher regulations for development of new or substantially improved structures located within the SFHA, the County's DPW Flood Control Engineering Group has begun the process of updating the Flood Damage Prevention Ordinance.

Fire Protection Districts and Municipal Water Districts

Special districts do not directly participate in the National Flood Insurance Program. Residents of the Fire protection Districts or Water Agencies participate in the NFIP through the process set up by the jurisdiction (City or County) they reside in.

Table 4.4-13
Potential Exposure and Losses from 100-Year Flood Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	6,906	3,045	\$857,168	102	\$457,133
Chula Vista	5,947	2,395	\$674,193	153	\$685,700
Coronado	2,853	1,227	\$345,401	30	\$134,451
Del Mar	813	435	\$122,453	42	\$188,231
El Cajon	1,870	657	\$184,946	36	\$161,341
Encinitas	653	234	\$65,871	22	\$98,597
Escondido	8,367	2,599	\$731,619	101	\$452,652
Imperial Beach	1,206	408	\$114,852	14	\$62,744
La Mesa	0	0	\$0	0	\$0
Lemon Grove	105	34	\$9,571	2	\$8,963
National City	2,854	893	\$251,380	118	\$528,841
Oceanside	19,007	6,715	\$1,890,273	217	\$972,529
Poway	2,518	814	\$229,141	47	\$210,640
San Diego (City)	36,042	12,191	\$3,431,767	523	\$2,343,929
San Marcos	2,377	794	\$223,511	70	\$313,719
Santee	1,873	572	\$161,018	46	\$206,158
Solana Beach	1,124	574	\$161,581	13	\$58,262
Unincorporated - Rural	7,276	3,661	\$1,030,572	137	\$613,993
Unincorporated - Urban Core	10,125	3,358	\$945,277	195	\$873,932
Vista	1,988	635	\$178,753	94	\$421,280
Total	113,904	41,241	\$11,609,342	1,962	\$8,793,095

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

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**Table 4.4-14
Potential Exposure to Critical Facilities and Infrastructure
from 100-Year Flood Hazard by Jurisdiction**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	6	0	0	0	0	0	0	20	0	0	0	0	1	27
	Exposure (x\$1000)	0	1,150	0	0	0	0	0	0	20	0	0	0	0	1,000	2,169
Chula Vista	Number	0	12	0	0	0	1	1	1	13	0	0	0	0	1	29
	Exposure (x\$1000)	0	2,299	0	0	0	2,000	2,000	100,000	25	0	0	0	0	1,000	107,324
Coronado	Number	0	1	0	0	0	0	1	0	2	0	0	0	0	0	4
	Exposure (x\$1000)	0	192	0	0	0	0	2,000	0	7	0	0	0	0	0	2,198
Del Mar	Number	0	3	0	0	0	0	0	0	4	0	0	0	0	0	7
	Exposure (x\$1000)	0	575	0	0	0	0	0	0	3	0	0	0	0	0	578
El Cajon	Number	0	2	0	0	0	0	0	0	3	0	0	0	0	5	10
	Exposure (x\$1000)	0	383	0	0	0	0	0	0	4	0	0	0	0	5,000	5,387
Encinitas	Number	0	4	0	0	0	0	0	0	5	0	1	0	0	0	10
	Exposure (x\$1000)	0	766	0	0	0	0	0	0	4	0	100,000	0	0	0	100,771
Escondido	Number	0	4	0	0	0	0	0	0	6	0	0	0	0	5	15
	Exposure (x\$1000)	0	766	0	0	0	0	0	0	15	0	0	0	0	5,000	5,781
Imperial Beach	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
National City	Number	0	8	0	0	0	0	1	0	9	1	0	0	0	1	20
	Exposure (x\$1000)	0	1,533	0	0	0	0	2,000	0	24	20,000	0	0	0	1,000	24,557
Oceanside	Number	1	17	0	1	0	2	3	0	28	0	0	0	0	5	57
	Exposure (x\$1000)	200,000	3,257	0	2,000	0	4,000	6,000	0	53	0	0	0	0	5,000	220,310
Poway	Number	0	7	0	0	0	1	0	0	1	0	0	0	0	0	9
	Exposure (x\$1000)	0	1,341	0	0	0	2,000	0	0	2	0	0	0	0	0	3,343
San Diego (City)	Number	0	74	1	3	0	0	2	1	66	49	0	0	1	3	200
	Exposure (x\$1000)	0	14,178	2,000	6,000	0	0	4,000	100,000	99	980,000	0	0	2,000	3,000	1,111,278
San Marcos	Number	0	3	0	0	0	0	0	2	6	0	0	0	0	2	13
	Exposure (x\$1000)	0	575	0	0	0	0	0	200,000	14	0	0	0	0	2,000	202,589
Santee	Number	0	9	0	0	0	0	0	0	3	0	0	0	0	0	12
	Exposure (x\$1000)	0	1,724	0	0	0	0	0	0	1	0	0	0	0	0	1,726
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	0	0	0	0	0	0	192
Unincorporated Rural	Number	3	36	0	1	0	4	0	0	51	0	0	0	0	12	107
	Exposure (x\$1000)	600,000	6,898	0	2,000	0	8,000	0	0	175	0	0	0	0	12,000	629,073
Unincorporated Urban Core	Number	0	14	0	0	0	1	1	0	18	0	0	0	0	0	34
	Exposure (x\$1000)	0	2,682	0	0	0	2,000	2,000	0	50	0	0	0	0	0	6,733
Vista	Number	0	0	0	0	0	1	1	0	2	0	0	0	1	0	5
	Exposure (x\$1000)	0	0	0	0	0	2,000	2,000	0	5	0	0	0	2,000	0	6,005
Total Number		4	201	1	5	0	10	10	4	239	50	1	0	2	35	562
Total Exposure (x\$1000)		800,000	38,512	2,000	10,000	0	20,000	20,000	400,000	504	1,000,000	100,000	0	4,000	35,000	2,430,016

Refer to Table 4.4-1 for abbreviation definition

Table 4.4-15
Potential Exposure and Losses from 500-Year Flood Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	6,996	3,086	\$868,709	104	\$466,097
Chula Vista	25,564	9,180	\$2,584,170	405	\$1,815,089
Coronado	3,868	1,715	\$482,773	46	\$206,158
Del Mar	1,062	567	\$159,611	47	\$210,640
El Cajon	17,608	6,457	\$1,817,646	278	\$1,245,913
Encinitas	678	243	\$68,405	23	\$103,079
Escondido	32,516	9,994	\$2,813,311	336	\$1,505,851
Imperial Beach	3,408	1,178	\$331,607	35	\$156,860
La Mesa	0	0	\$0	0	\$0
Lemon Grove	131	41	\$11,542	2	\$8,963
National City	8,584	2,735	\$769,903	259	\$1,160,760
Oceanside	37,323	12,878	\$3,625,157	368	\$1,649,266
Poway	4,690	1,540	\$433,510	79	\$354,054
San Diego (City)	85,289	28,438	\$8,005,297	1,126	\$5,046,394
San Marcos	2,609	875	\$246,313	77	\$345,091
Santee	2,994	967	\$272,211	60	\$268,902
Solana Beach	1,250	648	\$182,412	16	\$71,707
Unincorporated - Rural	8,950	4,426	\$1,245,919	151	\$676,737
Unincorporated - Urban Core	11,357	3,785	\$1,065,478	213	\$954,602
Vista	4,639	1,553	\$437,170	144	\$645,365
Total	259,516	90,306	\$25,421,139	3,769	\$16,891,527

**Table 4.4-16
Potential Exposure to Critical Facilities and Infrastructure
from 500-Year Flood Hazard by Jurisdiction**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	6	0	0	0	0	0	0	20	0	0	0	0	1	27
	Exposure (x\$1000)	0	1,150	0	0	0	0	0	0	20	0	0	0	0	1,000	2,169
Chula Vista	Number	0	18	0	0	1	1	1	1	30	1	0	0	0	3	56
	Exposure (x\$1000)	0	3,449	0	0	10,000	2,000	2,000	100,000	48	20,000	0	0	0	3,000	140,497
Coronado	Number	0	1	0	0	0	0	1	0	2	0	0	0	0	0	4
	Exposure (x\$1000)	0	192	0	0	0	0	2,000	0	7	0	0	0	0	0	2,198
Del Mar	Number	0	3	0	0	0	1	0	0	4	0	0	0	0	0	8
	Exposure (x\$1000)	0	575	0	0	0	2,000	0	0	4	0	0	0	0	0	2,578
El Cajon	Number	0	13	1	0	1	2	3	3	9	0	0	0	0	8	40
	Exposure (x\$1000)	0	2,491	2,000	0	10,000	4,000	6,000	300,000	19	0	0	0	0	8,000	332,510
Encinitas	Number	0	4	0	0	0	0	0	0	6	0	1	0	0	0	11
	Exposure (x\$1000)	0	766	0	0	0	0	0	0	5	0	100,000	0	0	0	100,771
Escondido	Number	0	20	0	0	0	2	5	2	14	0	0	0	0	11	54
	Exposure (x\$1000)	0	3,832	0	0	0	4,000	10,000	200,000	31	0	0	0	0	11,000	228,863
Imperial Beach	Number	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
National City	Number	0	12	0	0	0	1	2	0	11	1	0	0	0	2	29
	Exposure (x\$1000)	0	2,299	0	0	0	2,000	4,000	0	27	20,000	0	0	0	2,000	30,327
Oceanside	Number	1	21	0	2	0	4	4	1	37	0	0	0	1	6	77
	Exposure (x\$1000)	200,000	4,024	0	4,000	0	8,000	8,000	100,000	77	0	0	0	2,000	6,000	332,100
Poway	Number	0	8	0	0	0	1	0	0	1	0	0	0	0	1	11
	Exposure (x\$1000)	0	1,533	0	0	0	2,000	0	0	3	0	0	0	0	1,000	4,535
San Diego (City)	Number	0	119	2	3	0	2	8	3	122	49	1	0	1	5	315
	Exposure (x\$1000)	0	22,800	4,000	6,000	0	4,000	16,000	300,000	229	980,000	100,000	0	2,000	5,000	1,440,030
San Marcos	Number	0	4	0	0	0	0	0	2	6	0	0	0	0	2	14
	Exposure (x\$1000)	0	766	0	0	0	0	0	200,000	14	0	0	0	0	2,000	202,781
Santee	Number	0	9	0	2	0	0	1	0	5	0	0	0	0	0	17
	Exposure (x\$1000)	0	1,724	0	4,000	0	0	2,000	0	4	0	0	0	0	0	7,729
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	0	0	0	0	0	0	192
Unincorporated Rural	Number	3	39	0	1	0	4	1	0	56	0	0	0	0	13	117
	Exposure (x\$1000)	600,000	7,472	0	2,000	0	8,000	2,000	0	193	0	0	0	0	13,000	632,655
Unincorporated Urban Core	Number	0	15	0	0	0	1	1	0	20	0	0	0	0	1	38
	Exposure (x\$1000)	0	2,874	0	0	0	2,000	2,000	0	58	0	0	0	0	1,000	7,932
Vista	Number	0	1	0	0	0	2	2	0	4	0	0	0	1	4	14
	Exposure (x\$1000)	0	192	0	0	0	4,000	4,000	0	10	0	0	0	2,000	4,000	14,202
Total Number		4	294	3	8	2	21	29	12	349	51	2	0	3	57	835
Total Exposure (x\$1000)		800,000	56,330	6,000	16,000	20,000	42,000	58,000	1,200,000	753	1,020,000	200,000	0	6,000	57,000	3,482,083

Refer to Table 4.4-1 for abbreviation definition

SECTIONFOUR

Risk Assessment

4.4.2.6 Rain-Induced Landslide

Steep slope and soils data from SANDAG, as well as data from the State of California, U.S. Geological Survey and HAZUS for all of San Diego County were combined and modeled to determine areas susceptible to rain-induced landslides. Soils that are prone to movement were determined from the database, and combined with areas that have greater than 25% slope, which are prone to sliding. The combination of these two factors gives a general idea of landslide susceptibility. Localized hard copy maps developed by Tan were also reviewed. The TAN landslide susceptibility modeling takes into account more information, such as past landslides, landslide-prone formations, and steep slope. The identified vulnerable assets were superimposed on top of this information, resulting in three risk/exposure estimates: 1) the aggregated exposure and building count (both dollar exposure and population) at the census block level for residential and commercial occupancies, 2) the aggregated population at risk at the census block level, and 3) the critical infrastructure at risk (schools, hospitals, airports, bridges, and other facilities of critical nature). These results were then aggregated and presented by hazard risk level per jurisdiction.

Table 4.4-17 provides a breakdown of potential exposure for high-risk rain-induced landslide hazard by jurisdiction, and Table 4.4-18 provides a breakdown of infrastructure and critical facility exposure for high risk. Table 4.4-19 provides a breakdown of potential exposure for moderate risk rain-induced landslide by jurisdiction, and Table 4.4-20 provides a breakdown of potential infrastructure and critical facility exposure for moderate risk. Approximately 505,000 people may be at risk from the rain-induced landslide hazard. In addition, special populations at risk that may be impacted by the rain-induced landslide hazard in San Diego County include 22,346 low-income households and 57,564 elderly persons.

Table 4.4-17
Potential Exposure from Rain-Induced Landslide Hazard (High Risk) by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	455	204	\$57,426	2	\$8,963
Chula Vista	0	0	\$0	0	\$0
Coronado	0	0	\$0	0	\$0
Del Mar	0	0	\$0	0	\$0
El Cajon	35	22	\$6,193	0	\$0
Encinitas	24	7	\$1,971	0	\$0
Escondido	751	295	\$83,043	2	\$8,963
Imperial Beach	0	0	\$0	0	\$0
La Mesa	0	0	\$0	0	\$0
Lemon Grove	2	0	\$0	0	\$0
National City	0	0	\$0	0	\$0
Oceanside	0	0	\$0	0	\$0
Poway	2	0	\$0	0	\$0
San Diego (City)	137,095	48,049	\$13,525,794	1,072	\$4,804,382
San Marcos	1,441	457	\$128,646	4	\$17,927
Santee	35	12	\$3,378	0	\$0
Solana Beach	0	0	\$0	0	\$0
Unincorporated - Rural	9,130	3,573	\$1,005,800	93	\$416,798
Unincorporated - Urban Core	1,509	314	\$88,391	4	\$17,927
Vista	92	32	\$9,008	1	\$4,482
Total	150,571	52,965	\$14,909,648	1,178	\$5,279,443

SECTIONFOUR

Risk Assessment

Table 4.4-18

Potential Exposure to Critical Facilities and Infrastructure from Rain-Induced Landslide Hazard (High Risk) by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	17	0	10	0	6	4	0	93	0	0	0	0	22	152
	Exposure (x\$1000)	0	3,257	0	20,000	0	12,000	8,000	0	221	0	0	0	0	22,000	65,478
San Marcos	Number	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	2,000	0	0	0	0	0	0	0	0	2,000
Santee	Number	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	2,000	0	0	0	0	0	0	0	0	0	0	2,000
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	0	3	0	2	0	3	1	0	26	0	0	0	0	0	35
	Exposure (x\$1000)	0	575	0	4,000	0	6,000	2,000	0	82	0	0	0	0	0	12,657
Unincorporated Urban Core	Number	0	0	0	0	0	0	0	0	2	0	0	0	0	8	10
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	3	0	0	0	0	8,000	8,003
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number		0	20	0	13	0	10	5	0	121	0	0	0	0	30	199
Total Exposure (x\$1000)		0	3,832	0	26,000	0	20,000	10,000	0	306	0	0	0	0	30,000	90,138

Refer to Table 4.4-1 for abbreviation definition

Table 4.4-19
Potential Exposure to Rain-Induced Landslide Hazard (Moderate Risk) by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	57	30	\$8,445	0	\$0
Chula Vista	2	1	\$282	1	\$4,482
Coronado	0	0	\$0	0	\$0
Del Mar	0	0	\$0	0	\$0
El Cajon	39	13	\$3,660	1	\$4,482
Encinitas	6	1	\$282	0	\$0
Escondido	171	71	\$19,987	2	\$8,963
Imperial Beach	0	0	\$0	0	\$0
La Mesa	0	0	\$0	0	\$0
Lemon Grove	0	0	\$0	0	\$0
National City	7	2	\$563	0	\$0
Oceanside	0	0	\$0	0	\$0
Poway	0	0	\$0	0	\$0
San Diego (City)	10	3	\$845	0	\$0
San Marcos	970	286	\$80,509	0	\$0
Santee	0	0	\$0	0	\$0
Solana Beach	0	0	\$0	0	\$0
Unincorporated - Rural	23,197	4,188	\$1,178,922	89	\$398,871
Unincorporated - Urban Core	35,499	11,039	\$3,107,479	389	\$1,743,381
Vista	11	2	\$563	0	\$0
Total	59,969	15,636	\$4,401,534	482	\$2,160,179

Table 4.4-20
Potential Exposure to Critical Facilities and Infrastructure from
Rain-Induced Landslide Hazard (Moderate Risk) by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	0	0	0	0	0	0	192
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	1	20	0	0	0	3	0	0	39	0	0	0	0	4	67
	Exposure (x\$1000)	200,000	3,832	0	0	0	6,000	0	0	108	0	0	0	0	4,000	213,940
Unincorporated Urban Core	Number	0	29	0	0	0	8	2	1	36	0	0	0	2	12	90
	Exposure (x\$1000)	0	5,556	0	0	0	16,000	4,000	100,000	71	0	0	0	4,000	12,000	141,628
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number		1	50	0	0	0	11	2	1	75	0	0	0	2	16	158
Total Exposure (x\$1000)		200,000	9,580	0	0	0	22,000	4,000	100,000	179	0	0	0	4,000	16,000	355,759

SECTION FOUR

Risk Assessment

4.4.2.7 Wildfire/Structure Fire

Wildfire loss estimates were determined using the USGS LANDFIRE model because data for the CDF-FRAP model was being revised and would not be available for this revision. The LANDFIRE model provides five different Fire Regimes. In the model, fire threat is a combination of factors including; 1) historical fire regime and fire regime condition class, 2) existing vegetation, and 3) topography. These factors were combined to create five fire regime classes ranging from little or no threat to extreme. The regime classes are:

Fire Regime I -	0-35 year frequency and low to mixed severity
Fire Regime II -	0-35 year frequency and high severity
Fire regime III -	35-100+ year frequency and mixed severity
Fire Regime IV -	35-100 + year frequency and high severity
Fire Regime V -	200+ year frequency and high severity

The model uses spatial data in the ARC Grid format which includes existing vegetation types, historical vegetation data, and fire behavior fuel models. It also incorporates natural and human-caused changes. Fuel is considered to be any material that can burn and is further defined as live and dead biomass. Fuel loading is the dry weight of a fuel component per unit area, typically kilogram per square meter. Other factors such as surface-to-volume ratio, packing ratio and heat content are also considered⁴².

LANDFIRE uses the Fuel Characterization Classification System (FCCS) developed by Sandberg and others (2001) which summarizes fuel loading using canopy, shrub, surface and ground fuel stratifications. It also uses a fuel loading model developed specifically for LANDFIRE. This uses a broad classification of fuel beds based on fuel loading that accounts for variability of loading within fuel components⁴³.

Wildfire can create a multi-hazard effect, where areas that are burned by wildfire suddenly have greater flooding risks because the vegetation that prevented erosion is now gone. Watershed from streams and rivers will change and floodplain mapping may need to be updated. Also, air quality issues during a large-scale fire would cause further economic losses than only the structural losses described below. Road closures and business closures due to large-scale fires would also increase the economic losses shown below. Areas burned during the 2007 firestorm that are susceptible to flooding or debris flow as a result of a significant rain event have been mapped and these maps have been provided to the appropriate jurisdictions.

Tables 4.4-21 and 4.4-22 provide a breakdown of potential exposure to Fire Regimes II and IV. These two regimes provide the greatest risk to the San Diego region.

⁴² Keane, Robert F., Tracey Frescino, Matthew C. Reeves, and Jennifer L. Long, Mapping Wildland Fuel Across Large Regions for the LANDFIRE prototype Project, USDA Forest Service Gen. Tech. Rep. RMRS-GTR-175. 2006

⁴³ Ibid.

Table 4.4-21

by

FIRE REGIME GROUPS II AND IV - POPULATION						
Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk		TOTAL Buildings at Risk
		Building Count	Exposure (x\$1,000)	Square Footage	Exposure (x\$1,000)	Exposure (x\$1,000)
Carlsbad	99,892	43,157	12,148,696	29,541	10,339,342	22,488,038
Chula Vista	227,269	72,446	20,393,549	24,923	8,722,910	29,116,459
Coronado	22,740	9,263	2,607,535	3,372	1,180,036	3,787,571
Del Mar	3,791	2,288	644,072	2,055	719,363	1,363,435
El Cajon	96,248	32,872	9,253,468	18,121	6,342,347	15,595,815
Encinitas	57,529	23,980	6,750,370	15,107	5,287,475	12,037,845
Escondido	134,425	43,388	12,213,722	20,384	7,134,378	19,348,100
Imperial Beach	25,831	9,466	2,664,679	1,477	517,032	3,181,711
La Mesa	56,037	24,608	6,927,152	10,150	3,552,605	10,479,757
Lemon Grove	25,538	8,689	2,445,954	2,777	971,934	3,417,887
National City	57,267	15,144	4,263,036	9,300	3,255,165	7,518,201
Oceanside	157,029	60,356	16,990,214	17,827	6,239,477	23,229,691
Poway	43,624	15,054	4,237,701	12,366	4,328,138	8,565,839
San Diego (City)	1,244,722	486,276	136,886,694	262,238	91,783,418	228,670,112
San Marcos	79,610	25,994	7,317,311	14,638	5,123,300	12,440,611
Santee	45,353	16,283	4,583,665	5,307	1,857,498	6,441,162
Solana Beach	12,004	5,986	1,685,059	5,292	1,852,269	3,537,328
Vista	89,520	29,418	8,281,167	18,919	6,621,623	14,902,790
Unincorporated-Rural	88,262	27,785	7,821,478	12,481	4,368,416	12,189,894
Unincorporated-Urban	335,301	111,685	31,439,328	29,983	10,494,099	41,933,427
Padre Dam MWD	83,399	30,088	8,469,772	11,692	4,092,373	12,562,145
Valley Center MWD	22,390	7,410	2,085,915	3,023	1,058,187	3,144,102
Alpine FPD	12,885	4,814	1,355,141	1,355	474,178	1,829,319
Rancho Santa Fe FPD	24,260	10,052	2,829,638	4,463	1,562,217	4,391,855
San Miguel FPD	114,949	39,482	11,114,183	9,036	3,162,580	14,276,763
TOTAL¹	2,901,990	1,064,138	299,554,847	516,259	180,690,824	480,245,671
¹ Total includes municipalities and unincorporated area only; FPDs and MWDs are excluded from the total to avoid multiple counting of items.						

Potential Exposure from Extreme Wildfire Hazard Jurisdiction

Table 4.4-22
Potential Exposure from Very High Wildfire Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	3,219	1,294	\$364,261	33	\$147,896
Chula Vista	9,048	2,795	\$786,793	3	\$13,445
Coronado	19	0	\$0	0	\$0
Del Mar	7	5	\$1,408	0	\$0
El Cajon	97	36	\$10,134	2	\$8,963
Encinitas	1,267	424	\$119,356	14	\$62,744
Escondido	846	328	\$92,332	14	\$62,744
Imperial Beach	65	0	\$0	0	\$0
La Mesa	0	0	\$0	0	\$0
Lemon Grove	188	79	\$22,239	1	\$4,482
National City	0	0	\$0	0	\$0
Oceanside	1,402	470	\$132,305	7	\$31,372
Poway	937	305	\$85,858	17	\$76,189
San Diego (City)	20,153	6,990	\$1,967,685	208	\$932,194
San Marcos	2,236	818	\$230,267	8	\$35,854
Santee	222	89	\$25,054	3	\$13,445
Solana Beach	76	33	\$9,290	1	\$4,482
Unincorporated - Rural	47,816	18,209	\$5,125,834	658	\$2,948,959
Unincorporated - Urban Core	41,461	10,036	\$2,825,134	180	\$806,706
Vista	654	217	\$61,086	7	\$31,372
Total	129,713	42,128	\$11,859,032	1,156	\$5,180,845

Table 4.4-23
Potential Exposure from High Wildfire Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	9,255	4,298	\$1,209,887	72	\$322,682
Chula Vista	3,840	1,224	\$344,556	18	\$80,671
Coronado	0	0	\$0	0	\$0
Del Mar	16	9	\$2,534	1	\$4,482
El Cajon	118	42	\$11,823	3	\$13,445
Encinitas	1,159	419	\$117,949	18	\$80,671
Escondido	1,660	654	\$184,101	17	\$76,189
Imperial Beach	37	7	\$1,971	0	\$0
La Mesa	404	177	\$49,826	1	\$4,482
Lemon Grove	0	0	\$0	0	\$0
National City	9	2	\$563	5	\$22,409
Oceanside	2,795	849	\$238,994	21	\$94,116
Poway	3,069	976	\$274,744	55	\$246,494
San Diego (City)	30,997	10,710	\$3,014,865	280	\$1,254,876
San Marcos	11,312	3,578	\$1,007,207	30	\$134,451
Santee	2,658	938	\$264,047	18	\$80,671
Solana Beach	50	22	\$6,193	1	\$4,482
Unincorporated - Rural	8,518	3,197	\$899,956	108	\$484,024
Unincorporated - Urban Core	8,068	2,504	\$704,876	76	\$340,609
Vista	792	277	\$77,976	12	\$53,780
Total	84,757	29,883	\$8,412,065	736	\$3,298,531

Table 4.4-24
Potential Exposure from Moderate Wildfire Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	76,454	31,464	\$8,857,116	1,229	\$5,508,009
Chula Vista	169,128	57,512	\$16,189,628	1,963	\$8,797,577
Coronado	18,868	8,097	\$2,279,306	428	\$1,918,168
Del Mar	3,332	1,836	\$516,834	178	\$797,743
El Cajon	97,629	35,464	\$9,983,116	1,348	\$6,041,332
Encinitas	55,064	21,388	\$6,020,722	1,103	\$4,943,315
Escondido	134,126	43,671	\$12,293,387	1,745	\$7,820,567
Imperial Beach	26,346	9,139	\$2,572,629	310	\$1,389,327
La Mesa	56,195	25,030	\$7,045,945	946	\$4,239,688
Lemon Grove	25,058	8,606	\$2,422,589	361	\$1,617,894
National City	55,054	15,749	\$4,433,344	881	\$3,948,378
Oceanside	161,361	58,273	\$16,403,850	1,824	\$8,174,621
Poway	43,815	14,007	\$3,942,971	610	\$2,733,837
San Diego (City)	1,251,231	473,008	\$133,151,752	17,500	\$78,429,750
San Marcos	60,659	20,218	\$5,691,367	735	\$3,294,050
Santee	50,473	17,705	\$4,983,958	535	\$2,397,710
Solana Beach	11,413	5,585	\$1,572,178	303	\$1,357,955
Unincorporated - Rural	71,028	24,474	\$6,889,431	792	\$3,549,506
Unincorporated - Urban Core	255,909	86,104	\$24,238,276	2,970	\$13,310,649
Vista	90,913	28,908	\$8,137,602	1,106	\$4,956,760
Total	2,714,056	986,238	\$277,625,997	36,867	\$165,226,834

Table 4.4-25
Potential Exposure from Wildfire (Moderate, High, Very High, Extreme Combined) Hazard by Jurisdiction

Jurisdiction	Exposed Population	Residential Buildings at Risk		Commercial Buildings at Risk	
		Building Count	Potential Exposure (x\$1000)	Building Count	Potential Exposure (x\$1000)
Carlsbad	88,928	37,056	\$10,431,264	1,334	\$5,978,588
Chula Vista	182,033	61,536	\$17,322,384	1,984	\$8,891,693
Coronado	18,887	8,097	\$2,279,306	428	\$1,918,168
Del Mar	3,355	1,850	\$520,775	179	\$802,224
El Cajon	97,844	35,542	\$10,005,073	1,353	\$6,063,740
Encinitas	57,495	22,232	\$6,258,308	1,135	\$5,086,730
Escondido	136,697	44,680	\$12,577,420	1,776	\$7,959,499
Imperial Beach	26,448	9,146	\$2,574,599	310	\$1,389,327
La Mesa	56,599	25,207	\$7,095,771	947	\$4,244,170
Lemon Grove	25,246	8,685	\$2,444,828	362	\$1,622,375
National City	55,063	15,751	\$4,433,907	886	\$3,970,786
Oceanside	165,558	59,592	\$16,775,148	1,852	\$8,300,108
Poway	47,823	15,289	\$4,303,854	682	\$3,056,519
San Diego (City)	1,302,402	490,708	\$138,134,302	17,989	\$80,621,301
San Marcos	74,207	24,614	\$6,928,841	773	\$3,464,354
Santee	53,353	18,732	\$5,273,058	556	\$2,491,825
Solana Beach	11,539	5,640	\$1,587,660	305	\$1,366,919
Unincorporated - Rural	140,648	51,134	\$14,394,221	1,745	\$7,820,567
Unincorporated - Urban Core	307,689	99,272	\$27,945,068	3,249	\$14,561,043
Vista	92,372	29,407	\$8,278,071	1,125	\$5,041,913
Total	2,944,186	1,064,170	\$299,563,855	38,970	\$174,651,849

**Table 4.4-26
Potential Exposure to Critical Facilities and Infrastructures from Extreme Wildfire Hazard by Jurisdiction**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Encinitas	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanside	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Diego (City)	Number	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	2	22	1	14	0	5	0	0	114	0	0	0	0	2	160
	Exposure (x\$1000)	400,000	4,215	2,000	28,000	0	10,000	0	0	415	0	0	0	0	2,000	446,630
Unincorporated Urban Core	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	4	0	0	0	0	0	4
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number		2	22	1	14	0	5	0	0	120	0	0	0	0	2	166
Total Exposure (x\$1000)		400,000	4,215	2,000	28,000	0	10,000	0	0	426	0	0	0	0	2,000	446,641

Refer to Table 4.4-1 for abbreviation definition

**Table 4.4-27
Potential Exposure to Critical Facilities and Infrastructures from Very High Wildfire Hazard by Jurisdiction**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	RAIL	SCH	Total
Carlsbad	Number	0	1	0	0	0	0	1	1	2	0	0	0	2	7
	Exposure (x\$1000)	0	192	0	0	0	0	2,000	100,000	3	0	0	0	2,000	104,195
Chula Vista	Number	0	0	0	0	0	0	0	0	3	0	0	0	1	4
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	1,000	1,001
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	3	0	0	0	0	3
Encinitas	Number	0	1	0	0	0	0	0	0	1	0	0	0	0	2
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	1	0	0	0	0	193
Escondido	Number	0	1	0	0	0	0	0	0	2	0	0	0	0	3
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	4	0	0	0	0	196
Imperial Beach	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oceanside	Number	0	0	0	0	0	0	0	0	2	0	0	0	0	2
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	4	0	0	0	0	4
Poway	Number	0	0	0	0	0	0	0	0	3	0	0	0	1	4
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	8	0	0	0	1,000	1,008
San Diego (City)	Number	0	8	0	2	0	0	1	0	58	0	0	0	3	72
	Exposure (x\$1000)	0	1,533	0	4,000	0	0	2,000	0	134	0	0	0	3,000	10,667
San Marcos	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Santee	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Solana Beach	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	2	0	0	0	0	2
Unincorporated - Rural	Number	13	105	2	34	0	50	0	5	665	0	0	0	23	897
	Exposure (x\$1000)	2,600,000	20,118	4,000	68,000	0	100,000	0	500,000	2,173	0	0	0	23,000	3,317,291
Unincorporated - Urban Core	Number	0	9	0	0	0	6	1	2	75	0	0	0	6	99
	Exposure (x\$1000)	0	1,724	0	0	0	12,000	2,000	200,000	82	0	0	0	6,000	221,806
Vista	Number	0	0	0	0	0	0	0	0	1	0	0	0	1	2
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	1,000	1,000
Total Number		13	125	2	36	0	56	3	8	815	0	0	0	37	1,095
Total Exposure (x\$1000)		2,600,000	23,950	4,000	72,000	0	112,000	6,000	800,000	2,417	0	0	0	37,000	3,657,367

Refer to Table 4.4-1 for abbreviation definition

Table 4.4-28
Potential Exposure to Critical Facilities and Infrastructures from High Wildfire Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	0	0	0	0	0	0	0	0	19	0	0	0	0	3	22
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	27	0	0	0	0	3,000	3,027
Chula Vista	Number	0	1	0	0	0	0	0	0	2	0	0	0	0	1	4
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	4	0	0	0	0	1,000	1,195
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
El Cajon	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3
Encinitas	Number	0	3	0	0	0	0	0	0	3	0	1	0	0	0	7
	Exposure (x\$1000)	0	575	0	0	0	0	0	0	1	0	100,000	0	0	0	100,576
Escondido	Number	0	0	0	1	0	0	0	0	7	0	0	0	0	0	8
	Exposure (x\$1000)	0	0	0	2,000	0	0	0	0	5	0	0	0	0	0	2,005
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
La Mesa	Number	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
National City	Number	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
	Exposure (x\$1000)	0	192	0	0	0	0	0	0	0	0	0	0	0	0	192
Oceanside	Number	0	1	0	0	0	0	1	0	8	0	0	0	0	0	10
	Exposure (x\$1000)	0	192	0	0	0	0	2,000	0	16	0	0	0	0	0	2,208
Poway	Number	0	2	0	0	0	0	0	0	7	0	0	0	0	1	10
	Exposure (x\$1000)	0	383	0	0	0	0	0	0	22	0	0	0	0	1,000	1,405
San Diego (City)	Number	0	13	0	3	0	0	0	0	51	0	0	0	0	8	75
	Exposure (x\$1000)	0	2,491	0	6,000	0	0	0	0	92	0	0	0	0	8,000	16,582
San Marcos	Number	0	1	0	2	0	1	0	0	2	0	0	0	0	0	6
	Exposure (x\$1000)	0	192	0	4,000	0	2,000	0	0	4	0	0	0	0	0	6,196
Santee	Number	0	0	0	1	0	0	0	0	2	0	0	0	0	0	3
	Exposure (x\$1000)	0	0	0	2,000	0	0	0	0	5	0	0	0	0	0	2,005
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exposure (x\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unincorporated Rural	Number	4	17	0	2	0	3	1	0	136	0	0	0	0	2	165
	Exposure (x\$1000)	800,000	3,257	0	4,000	0	6,000	2,000	0	446	0	0	0	0	2,000	817,703
Unincorporated Urban Core	Number	0	6	0	0	0	1	0	2	16	0	0	1	0	0	26
	Exposure (x\$1000)	0	1,150	0	0	0	2,000	0	200,000	21	0	0	100,000	0	0	303,171
Vista	Number	0	0	0	0	0	1	0	0	2	0	0	0	0	1	4
	Exposure (x\$1000)	0	0	0	0	0	2,000	0	0	1	0	0	0	0	1,000	3,001
Total Number		4	45	0	9	0	6	2	2	255	0	1	1	0	16	341
Total Exposure (x\$1000)		800,000	8,622	0	18,000	0	12,000	4,000	200,000	648	0	100,000	100,000	0	16,000	1,259,270

Refer to Table 4.4-1 for abbreviation definition

Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)

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Table 4.4-29
Potential Exposure to Critical Facilities and Infrastructures from Moderate Wildfire Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	1	19	0	2	1	7	4	1	89	0	1	0	0	18	143
	Exposure (x\$1000)	200,000	3,640	0	4,000	10,000	14,000	8,000	100,000	153	0	100,000	0	0	18,000	457,793
Chula Vista	Number	0	39	2	2	1	11	8	7	85	0	1	0	0	59	215
	Exposure (x\$1000)	0	7,472	4,000	4,000	10,000	22,000	16,000	700,000	165	0	100,000	0	0	59,000	922,638
Coronado	Number	0	1	0	1	0	3	4	1	12	0	0	0	0	9	31
	Exposure (x\$1000)	0	192	0	2,000	0	6,000	8,000	100,000	12	0	0	0	0	9,000	125,204
Del Mar	Number	0	5	0	0	0	1	2	0	10	0	0	0	0	2	20
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	7	0	0	0	0	2,000	8,965
El Cajon	Number	1	37	1	2	1	8	7	6	61	0	0	0	0	47	171
	Exposure (x\$1000)	200,000	7,089	2,000	4,000	10,000	16,000	14,000	600,000	153	0	0	0	0	47,000	900,242
Encinitas	Number	0	11	0	1	0	6	3	3	72	0	0	0	7	23	126
	Exposure (x\$1000)	0	2,108	0	2,000	0	12,000	6,000	300,000	127	0	0	0	14,000	23,000	359,235
Escondido	Number	0	67	1	1	0	6	8	8	68	0	1	0	1	43	204
	Exposure (x\$1000)	0	12,837	2,000	2,000	0	12,000	16,000	800,000	187	0	100,000	0	2,000	43,000	990,024
Imperial Beach	Number	0	1	0	0	0	2	2	2	3	0	0	0	0	8	18
	Exposure (x\$1000)	0	192	0	0	0	4,000	4,000	200,000	2	0	0	0	0	8,000	216,194
La Mesa	Number	0	36	0	1	0	4	4	2	52	0	0	0	0	25	124
	Exposure (x\$1000)	0	6,898	0	2,000	0	8,000	8,000	200,000	112	0	0	0	0	25,000	250,010
Lemon Grove	Number	0	8	0	0	0	2	3	0	23	0	0	0	0	10	46
	Exposure (x\$1000)	0	1,533	0	0	0	4,000	6,000	0	58	0	0	0	0	10,000	21,551
National City	Number	0	46	1	1	2	4	4	7	37	0	1	0	2	20	125
	Exposure (x\$1000)	0	8,814	2,000	2,000	20,000	8,000	8,000	700,000	87	0	100,000	0	4,000	20,000	872,901
Oceanside	Number	1	37	2	4	0	10	9	11	103	0	1	0	7	37	222
	Exposure (x\$1000)	200,000	7,089	4,000	8,000	0	20,000	18,000	1,100,000	206	0	100,000	0	14,000	37,000	1,508,295
Poway	Number	0	40	1	0	0	3	1	1	22	0	0	1	0	22	91
	Exposure (x\$1000)	0	7,664	2,000	0	0	6,000	2,000	100,000	60	0	0	100,000	0	22,000	239,724
San Diego (City)	Number	4	445	12	22	8	85	95	49	750	3	2	2	5	339	1,821
	Exposure (x\$1000)	800,000	85,262	24,000	44,000	80,000	170,000	190,000	4,900,000	1,686	60,000	200,000	200,000	10,000	339,000	7,103,948
San Marcos	Number	0	11	0	0	0	7	3	2	54	0	0	0	2	20	99
	Exposure (x\$1000)	0	2,108	0	0	0	14,000	6,000	200,000	136	0	0	0	4,000	20,000	246,244
Santee	Number	0	14	1	1	0	3	2	0	27	0	1	0	0	15	64
	Exposure (x\$1000)	0	2,682	2,000	2,000	0	6,000	4,000	0	60	0	100,000	0	0	15,000	131,742
Solana Beach	Number	0	5	0	0	0	1	1	0	27	0	0	0	1	9	44
	Exposure (x\$1000)	0	958	0	0	0	2,000	2,000	0	44	0	0	0	2,000	9,000	16,002
Unincorporated Rural	Number	13	72	0	5	3	35	2	5	383	0	0	1	0	38	557
	Exposure (x\$1000)	2,600,000	13,795	0	10,000	30,000	70,000	4,000	500,000	1,289	0	0	100,000	0	38,000	3,367,085
Unincorporated Urban Core	Number	0	96	0	1	0	30	7	6	194	0	1	1	2	100	438
	Exposure (x\$1000)	0	18,394	0	2,000	0	60,000	14,000	600,000	415	0	100,000	100,000	4,000	100,000	998,808
Vista	Number	0	12	0	0	0	8	4	3	48	0	0	0	9	38	122
	Exposure (x\$1000)	0	2,299	0	0	0	16,000	8,000	300,000	95	0	0	0	18,000	38,000	382,394
Total Number		20	1,002	21	44	16	236	173	114	2,118	3	9	5	36	882	4,679
Total Exposure (x\$1000)		4,000,000	191,983	42,000	88,000	160,000	472,000	346,000	11,400,000	5,056	60,000	900,000	500,000	72,000	882,000	19,119,039

Refer to Table 4.4-1 for abbreviation definition

Table 4.4-30
Potential Exposure to Critical Facilities and Infrastructures from
(Moderate, High, Very High, Extreme Combined) Wildfire Hazard by Jurisdiction

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	WWTR	RAIL	SCH	Total
Carlsbad	Number	1	20	0	2	1	7	5	2	110	0	1	0	0	23	172
	Exposure (x\$1000)	200,000	3,832	0	4,000	10,000	14,000	10,000	200,000	183	0	100,000	0	0	23,000	565,015
Chula Vista	Number	0	40	2	2	1	11	8	7	95	0	1	0	0	61	228
	Exposure (x\$1000)	0	7,664	4,000	4,000	10,000	22,000	16,000	700,000	185	0	100,000	0	0	61,000	924,849
Coronado	Number	0	1	0	1	0	3	4	1	12	0	0	0	0	9	31
	Exposure (x\$1000)	0	192	0	2,000	0	6,000	8,000	100,000	13	0	0	0	0	9,000	125,204
Del Mar	Number	0	5	0	0	0	1	2	0	10	0	0	0	0	2	20
	Exposure (x\$1000)	0	958	0	0	0	2,000	4,000	0	7	0	0	0	0	2,000	8,965
El Cajon	Number	1	37	1	2	1	8	7	6	63	0	0	0	0	47	173
	Exposure (x\$1000)	200,000	7,089	2,000	4,000	10,000	16,000	14,000	600,000	159	0	0	0	0	47,000	900,248
Encinitas	Number	0	15	0	1	0	6	3	3	76	0	1	0	6	25	136
	Exposure (x\$1000)	0	2,874	0	2,000	0	12,000	6,000	300,000	130	0	100,000	0	12,000	25,000	460,004
Escondido	Number	0	68	1	2	0	6	8	8	76	0	1	1	1	43	214
	Exposure (x\$1000)	0	13,029	2,000	4,000	0	12,000	16,000	800,000	197	0	100,000	100,000	2,000	43,000	1,092,226
Imperial Beach	Number	0	1	0	0	0	2	2	2	4	0	0	0	0	8	19
	Exposure (x\$1000)	0	192	0	0	0	4,000	4,000	200,000	2	0	0	0	0	8,000	216,194
La Mesa	Number	0	36	0	1	0	4	4	2	53	0	0	0	0	25	125
	Exposure (x\$1000)	0	6,898	0	2,000	0	8,000	8,000	200,000	113	0	0	0	0	25,000	250,010
Lemon Grove	Number	0	8	0	0	0	2	3	0	23	0	0	0	0	10	46
	Exposure (x\$1000)	0	1,533	0	0	0	4,000	6,000	0	58	0	0	0	0	10,000	21,591
National City	Number	0	47	1	1	2	4	4	7	37	0	1	0	2	20	126
	Exposure (x\$1000)	0	9,005	2,000	2,000	20,000	8,000	8,000	700,000	87	0	100,000	0	4,000	20,000	873,093
Oceanside	Number	1	38	2	4	0	10	10	11	112	0	1	0	7	37	233
	Exposure (x\$1000)	200,000	7,281	4,000	8,000	0	20,000	20,000	1,100,000	226	0	100,000	0	14,000	37,000	1,510,506
Poway	Number	0	42	1	0	0	3	1	1	31	0	0	1	0	24	103
	Exposure (x\$1000)	0	8,047	2,000	0	0	6,000	2,000	100,000	89	0	0	100,000	0	24,000	242,137
San Diego (City)	Number	4	466	12	27	8	85	96	49	859	3	2	3	5	350	1,966
	Exposure (x\$1000)	800,000	89,286	24,000	54,000	80,000	170,000	192,000	4,900,000	1,912	60,000	200,000	300,000	10,000	350,000	7,231,198
San Marcos	Number	0	12	0	2	0	8	3	2	56	0	0	0	2	20	105
	Exposure (x\$1000)	0	2,299	0	4,000	0	16,000	6,000	200,000	142	0	0	0	4,000	20,000	252,441
Santee	Number	0	14	1	2	0	3	2	0	30	0	1	0	0	15	68
	Exposure (x\$1000)	0	2,682	2,000	4,000	0	6,000	4,000	0	65	0	100,000	0	0	15,000	133,748
Solana Beach	Number	0	5	0	0	0	1	1	0	28	0	0	0	1	9	45
	Exposure (x\$1000)	0	958	0	0	0	2,000	2,000	0	46	0	0	0	2,000	9,000	16,004
Unincorporated Rural	Number	30	194	2	41	3	88	3	10	1,184	0	0	3	0	63	1,618
	Exposure (x\$1000)	6,000,000	37,170	4,000	82,000	30,000	176,000	6,000	1,000,000	3,908	0	0	300,000	0	63,000	7,702,078
Unincorporated Urban Core	Number	0	111	0	1	0	37	8	10	285	0	1	2	2	106	561
	Exposure (x\$1000)	0	21,268	0	2,000	0	74,000	16,000	1,000,000	518	0	100,000	200,000	4,000	106,000	1,523,785
Vista	Number	0	12	0	0	0	9	4	3	50	0	0	0	9	40	127
	Exposure (x\$1000)	0	2,299	0	0	0	18,000	8,000	300,000	96	0	0	0	18,000	40,000	386,395
Total Number		37	1,172	23	89	16	298	178	124	3,192	3	10	10	35	937	6,114
Total Exposure (x\$1000)		7,400,000	224,555	46,000	178,000	160,000	596,000	356,000	12,400,000	8,136	60,000	1,000,000	1,000,000	70,000	937,000	24,435,691

Refer to Table 4.4-1 for abbreviation definition

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4.4.2.8 Manmade Hazards

Vulnerability assessment information for manmade hazards is considered sensitive homeland security information and is provided in a separate confidential document (Attachment A).

4.5 Multi-Jurisdictional Assessment

It should be noted that individual risk assessment maps were completed for each of the 18 participating incorporated cities as well as the unincorporated County. Hazard profile maps were created at a local (1:2,000) scale, complete with land use information, critical facility information, infrastructure and hazard areas for each of the 19 jurisdictions. Jurisdictional HMWG leads were presented copies of these maps to provide to their Local Mitigation Planning teams. The local teams utilized these maps to help identify their jurisdictional Goals, Objectives, and Mitigation Measures. Several of the local goals, objectives, and action items identified in the proceeding section (Section 5) relate directly to these risk assessment maps. Due to concern of sensitivity of information depicted on these localized maps, only the County-scale maps are included in the Plan.

4.5.1 Analysis of Land Use

San Diego County covers 4,264 square miles and is located in the southernmost corner of the state, bordering Mexico and the Pacific Ocean. There are 18 jurisdictions in the County with a total of over 888 thousand households in the region and a total population of 2,813,833 (2000 Census Bureau data). Existing land use data (Figure 4.5.1) was utilized in the hazard profiling process. Forecast land use information for 2030 from the Regional Economic Development Information system (REDI) was evaluated in analyzing future development trends. Existing land use consists of mainly residential, commercial and industrial in the western (urban core) portion of the county. The eastern area (unincorporated rural) is spotted with residential surrounded by park and ‘not in use’ areas. The forecast land use describes residential land use becoming the most predominant land use in the urban core of the county and expanding largely into the eastern portion of the county. In the eastern portion of the county, Native American Reservations and parks will make up the rest of the land use designations.

Within the county, there are 18 incorporated jurisdictions and the County jurisdiction, all of which contributed to the risk assessment analyses for the San Diego County Hazard Mitigation Plan. Wildfire and flood were identified as the most significant risks to the County, however, all hazards are addressed in the Mitigation Plan. Each jurisdiction has unique hazard situations that require additional or unique mitigation measures. The loss estimates are summarized above in tables that show potential total exposure and/or losses for each jurisdiction. The Mitigation Strategy (Section 5) approaches each jurisdiction separately.

4.5.2 Analysis of Development Trends

The San Diego Association of Governments (SANDAG) is a regional planning body whose membership includes all 18 incorporated cities and the County of San Diego. SANDAG plays a key role in regional coordination efforts. In 2004 the SANDAG Board of Directors adopted a Regional Comprehensive Plan (RCP) that provides a strategic framework for the San Diego Region. It encourages cities and the county to increase residential and employment concentrations in areas with the best existing and future transit connections, and to preserve important open spaces “Smart Growth”). City general plans are being aligned with the RCP as they are revised.

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Many of the jurisdictions in San Diego County are close to being “built-out” under their general plans. A few representative examples will illustrate the trends throughout the region:

- The City of San Diego has less than four percent (4%) of its land available for development. For the City of San Diego this means that the focus is now on how to reinvest in existing communities (City of San Diego General Plan, March 2008). The City’s General Plan takes hazard mitigation into consideration in the Public Facilities, Services and Safety Element by discussing disaster preparedness (preparation for natural and man-made disasters as well as preparations for restoration of municipal services) and seismic safety.
- The City of Poway’s Plan calls for the preservation of open space and the maintenance of the City’s rural character. (Poway Comprehensive Plan: General Plan). Accordingly, future development “in Poway should be concentrated in parts of the City other than the rural hillside areas and existing open space should be protected.” This is intended to limit growth to the “enhancement of existing developed and developing areas.”
- The City of National City has only 0.8% (113 acres) of land vacant and available for development. It has adopted the SANDAG Smart Growth concept. Additional opportunities for future development may include a change to an existing use within a built-up area, rebuilding sites with more intense uses or building on under-utilized sites. (City of National City General Plan, Chapter 2 Land Use).
- The City of Chula Vista also subscribes to the SANDAG Smart Growth concept. Chula Vista was one of the fastest growing cities in the State during the 1990s and the early initial years of the 21st century. This growth occurred mostly in the eastern portion of the City on large, vacant tracts of land. Western Chula Vista is for the most part already developed. Chula Vista’s emphasis is shifting from the development of vacant lands in the eastern portion of the City to revitalizing the already developed areas. “Redevelopment will play a prominent role in the City’s evolution” (City of Chula Vista General Plan, Chapter Five, Land Use Element).
- The City of Encinitas still contains a number of underdeveloped or undeveloped areas that can accommodate additional homes or businesses. It is the intent of the City to achieve a balanced and functional mix of development consistent with the long-range goals, objectives and values of the City (City of Encinitas General Plan April, 2013). Among the things the City seeks to accomplish with this plan the “reduction of loss of life, injury, and property damage that might result from flooding, seismic hazards and other natural and man-made hazards that need to be
- The County of San Diego will manage growth in the unincorporated areas through the use of zoning regulations, building codes and the permit process (San Diego County General Plan). Hazard mitigation measures to minimize landslides, flooding, and other natural and man-made hazards are found in the plan. The 2010 Multi-Jurisdictional Hazard Mitigation Plan has been included into the General Plan by reference.

The result of this is that much of the new development in the near term will occur in the unincorporated portion of San Diego County. In the near future development trends will shift towards the redevelopment of urban cores. Hazards mapped in these areas include wildfire, flood, earthquake, and dam failure. The two most prevalent hazards related to development trends appear to be the increasing density in downtown San Diego near the Rose Canyon Fault Zone (earthquake and liquefaction hazard) and the expansion of the urban/wildland interface by new development throughout the county, but especially in east and south county (wildfire hazard). It should also be noted that high-rise residential and commercial development has

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increased significantly in the downtown San Diego and Golden Triangle areas and these developments present a potential new type of structural fire hazard risk.

The population is estimated to increase to approximately 4.4 million by 2050 (SANDAG, 2010). The forecast land use describes residential land use becoming the most predominant land use in the urban core of the county and expanding largely into the eastern portion of the county.

The original plan predicted that near term development (that development that would occur over the course of the four year life of the plan) would be concentrated mostly in the unincorporated urban core and the southeastern portion of San Diego County in and around the City of Chula Vista. For the first few years this prediction appeared to be accurate. Beginning in 2008, the economic downturn resulted in a significant slow-down within the region in terms of growth and caused a very large downturn in median home prices. It is estimated that the downturn resulted in a \$4 billion loss to San Diego County as a result of the change it caused in consumer spending habits. The median price of a home in San Diego County dropped from approximately \$600,000 in 2006 to approximately \$400,000 in 2012. The current median price of home is \$488,000 up approximately since 2014.

2008 saw the unemployment rate rise to 7.6% in San Diego with the loss of 56,500 jobs by January of 2009. This was the worst job loss in San Diego since 1974. In 2008 there were fewer than 3000 residential building permits issued. The normal average is 14,000. By April of 2009 the total number of unemployed in San Diego had reached 135,000, for an unemployment rate of 8.6%. (National Association of Counties "A Snapshot of Large, Urban Counties" April, 2009). Current unemployment rate for the San Diego region is 4.6%, down from 5.1% in August 2015. Since September 2014 there has been an increase of 46,900 nonfarm jobs in San Diego.

4.5.2.1 Data Limitations

It should be noted that the analysis presented here is based upon "best available data". See Appendix B for a complete listing of sources and their unique data limitations (if any). Data used in updates to this plan should be reassessed upon each review period to incorporate new or more accurate data if/when possible.

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SECTION FIVE

Goals, Objectives and Actions

5.1 Overview

After each participating jurisdiction reviewed the Risk Assessment (Section 4), jurisdictional leads met with their individual Local Planning Groups (LPG) to identify appropriate jurisdictional-level goals, objectives, and mitigation action items. This section of the Plan incorporates 1) mitigation goals and objectives, 2) mitigation actions and priorities, 3) an implementation plan, and 4) documentation of the mitigation planning process for each of the twenty one (21) participating jurisdictions. Each of these steps is described as follows.

5.1.1 Develop Mitigation Goals and Objectives

Each jurisdiction reviewed hazard profile and loss estimation information presented in Section 4 and utilized this as a basis for developing mitigation goals and objectives. Mitigation goals are defined as general guidelines explaining what each jurisdiction wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements representing jurisdiction-wide visions. Objectives are statements that detail how each jurisdiction's goals will be achieved, and typically define strategies or implementation steps to attain identified goals. Other important inputs to the development of jurisdiction-level goals and objectives include performing reviews of existing local plans, policy documents, and regulations for consistency and complementary goals, as well as soliciting input from the public.

5.1.2 Identify and Prioritize Mitigation Actions

Mitigation actions that address the goals and objectives developed in the previous step were identified, evaluated, and prioritized. These actions form the core of the mitigation plan. Jurisdictions conducted a capabilities assessment, reviewing existing local plans, policies and regulations for any other capabilities relevant to hazard mitigation planning. An analysis of their capability to carry out these implementation measures with an eye toward hazard and loss prevention was conducted. The capabilities assessment required an inventory of each jurisdiction's legal, administrative, fiscal and technical capacities to support hazard mitigation planning. After completion of the capabilities assessment, each jurisdiction evaluated and prioritized their proposed mitigations.

As part of this process, each city and the County reviewed the actions detailed in the 2010 plan to see if they were completed, had been dropped due to issues such as lack of political support or lack of funding or were on-going and should be continued in the new plan. The status of each jurisdiction's action items is detailed in Appendix C. Also considered were changes in development, mitigation efforts and priorities.

Each participant used their local planning group to evaluate alternative mitigation actions by considering the implications of each action item. One potential method available to the cities to accomplish this was the STAPLEE method. The STAPLEE criteria are a tool used to assist communities in deciding which actions to include in their implementation strategy. The criteria are designed to account for a wide range of factors that affect the appropriateness of an action. STAPLEE considers the following criteria:

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- **Social:** Community acceptance, public support, adverse effects on population segments, health/welfare/safety impacts, and financial effects
- **Technical:** Technical feasibility, long term effectiveness, and secondary impacts
- **Administrative:** Staff, funding, and maintenance capabilities
- **Political:** Political support, local champion, and public support
- **Legal:** State authority, existing local authority, and potential opposition
- **Economic:** Benefits, costs, and availability of outside funding
- **Environmental:** impact on environment and endangered species, local regulations and California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) considerations.

Local planning groups are comprised of individuals from the various jurisdictional departments bringing their experience and knowledge of the region, the jurisdiction and local constraints to assist in the evaluation of the hazards and the development of mitigations strategies, goals and objectives. Individual LPG membership is discussed in each jurisdictions section of this chapter.

Each jurisdiction also considered the following: ease of implementation; multi-objective actions; time for implementation and post-disaster mitigation feasibility. Utilizing the above information, each community ranked the possible action items on a prioritization scale of high, medium, and low. A High ranking indicated that the hazard has a high probability of occurrence and/or a severe impact on the community. The Medium ranking indicated a moderate potential for occurrence or impact. Those hazards with a low probability of occurrence but with a potentially high impact were also ranked as medium. The Low ranking indicates that the potential for the event to occur is remote and/or the impact of the event is minimal to the community. Only those hazards that received a high or moderate ranking were considered in the mitigation planning process.

Many of these hazards were ranked differently by individual jurisdictions. For example, tsunamis received a relatively high ranking among coastal jurisdictions while inland jurisdictions did not consider them for mitigation action. All jurisdictions rated wildfire high (based on the firestorms of 2003 and 2007). Flooding and Earthquake (based on the known faults within the County) were also rated high by all participants. Table 5.X-1 *Summary of Potential Hazard-Related Exposure/Loss* formed the initial ranking basis for the individual participants. The hazards selected by each jurisdiction for mitigation actions are included in their section of this Chapter. In all cases the actions selected are prioritized based on the benefit of the action compared to the cost (in terms of funding, staff time, time to complete) of conducting that action. Those actions that will provide the most benefits in the least amount of time with available resources were selected as the highest priorities. That is not to say the other actions are not considered important. It merely indicates that we set out to complete what we could with current resources. The other actions will be completed as additional resources become available.

There were nine Goals established by the HMWG. They are listed below (in the order of importance assigned by the jurisdictions):

1. Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to geologic hazards (includes Earthquakes, landslides, liquefaction, etc.).
2. Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to structure fire/wildfire.

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3. Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to flooding/dam failure.
4. Increase public understanding and support for effective hazard mitigation.
5. Improve hazard mitigation coordination and communication with federal, State, local and tribal governments.
6. Promote disaster resistant existing and future development.
7. Build and support local capacity and commitment to continuously become less vulnerable to hazards.
8. Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to coastal erosion/coastal bluff failure/storm surge/Tsunami.
9. Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to severe weather.

Each jurisdiction then identified and prioritized actions. They listed those with the highest short to medium term priorities. Not all jurisdictions included all the goals. Some jurisdictions included unique goals (such as minimizing losses by prompt resumption of City operations and restoration of City services). Others split the goals into multiple ones (i.e., some have a separate earthquake goal as opposed to a geologic hazard goal). An implementation schedule, funding source and coordinating individual or agency are identified for each prioritized action item.

Each jurisdiction prepared a strategy for implementing the mitigation actions identified in the previous step. The implementation strategies identify who is responsible for which action, what kind of funding mechanisms and other resources are available or will be pursued, and when the strategies will be completed.

In combination, the goals, objectives, actions and implementation strategies form the body of each jurisdiction's Plan. The following subsections present individual Plans for each of the 19 jurisdictions as well as the Fire Protection District.

5.2 Regional Considerations

The Risk Assessment (Section 4) indicates that each participating jurisdiction is susceptible to a variety of potentially serious hazards in the region. This had been recognized and formally addressed as early as the 1960s. At that time all of the cities and the County formed a Joint Powers Agreement which established the Unified San Diego County Emergency Services Organization (Organization) and the Unified Disaster Council (UDC) which is the policy making group of the Organization. It also created the Office of Disaster Preparedness (now OES), which is staff to the Organization.

The Organization's approach to emergency planning has been comprehensive, i.e., planned for and prepared to respond to all hazards: natural disasters, man-made emergencies, and war-related emergencies, utilizing the State of California's Standardized Emergency Management System

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(SEMS), the National Incident Management System (NIMS) as well as a coordinated Incident Command System. OES is the agency charged with developing and maintaining the San Diego County Operational Area Emergency Plan, which is considered a preparedness document.

The Disaster Mitigation Act of 2000 requires that in addition to having emergency response and emergency preparedness documents, regions should develop and maintain a document outlining measures that can be taken before a hazard event occurs that would help minimize the damage to life and property. The UDC assigned OES the role of coordinating the development of the Plan as a multi-jurisdictional plan.

The Plan includes specific goals, objectives, and mitigation action items each of the participating jurisdictions developed that will help minimize the effects of the specified hazards that potentially affect their jurisdiction. Some overall goals and objectives shared some commonalities (including promoting disaster-resistant future development; increasing public understanding, support, and demand for effective hazard mitigation; building and supporting local capacity and commitment to continuously becoming less vulnerable to hazards; and improving coordination and communication with federal, state, local and tribal governments). However, the specific hazards and degree of risk vary greatly between the different jurisdictions; and the mix of other goals and objectives, and most action items are unique to each jurisdiction. Consequently, the goals, objectives and action items in this Plan are presented by individual jurisdiction and special district.

It is also envisioned that these mitigation actions will be implemented on a jurisdiction-by-jurisdiction basis. However, UDC and OES will provide general oversight to this process to help reduce duplication of efforts between jurisdictions as appropriate, and to spearhead coordination of initiatives and action items that could be accomplished more efficiently on a regional level.

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5.21 County of San Diego

The Unincorporated portion of the County of San Diego (County) reviewed a set of jurisdictional-level hazard maps including detailed critical facility information and localized potential hazard exposure/loss estimates to help identify the top hazards threatening their jurisdiction. In addition, LPGs were supplied with exposure/loss estimates for the County summarized in Tables 5.21-1a and 5.21-1b. See Section 4.0 for additional details.

Table 5.21-1a
Summary of Potential Hazard-Related Exposure/Loss in the County (Urban)

Hazard Type	Exposed Population	Residential		Commercial		Critical Facilities	
		Number of Residential Buildings	Potential Exposure/Loss for Residential Buildings (x\$1,000)	Number of Commercial Buildings	Potential Exposure/Loss for Commercial Buildings (x\$1,000)	Number of Critical Facilities	Potential Exposure for Critical Facilities (x\$1,000)
Coastal Storm / Erosion	0	0	0	0	0	0	0
Sea Level Rise	0	0	0	0	0	0	0
Dam Failure	21,862	7,304	2,056,076	277	1,241,431	123	235,356
Earthquake (Annualized Loss - Includes shaking, liquefaction and landslide components)	333,626*	108,042*	8,963*	3,560*	15,954,852*	290*	820,725*
Flood (Loss)							
100 Year	10,125	3,358	945,277	195	873,932	34	6,733
500 Year	11,357	3,785	1,065,478	213	954,602	38	7,932
Rain-Induced Landslide							
High Risk	1,509	314	88,391	4	17,927	10	8,003
Moderate Risk	35,499	11,039	3,107,479	389	1,743,381	12	141,628
Tsunami	35	11	3,097	1	4,482	1	2
Wildfire / Structure Fire							
Fire Regime II & IV	335,301	111,685	31,439,328	29,983	10,494,099	561	1,523,785

* Represents 250-year earthquake value under three earthquake scenarios (shake only, shake and liquefaction, and shake and landslide).

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Table 5.21-1b

Summary of Potential Hazard-Related Exposure/Loss in the County (Rural)

Hazard Type	Exposed Population	Residential		Commercial		Critical Facilities	
		Number of Residential Buildings	Potential Exposure/ Loss for Residential Buildings (x\$1,000)	Number of Commercial Buildings	Potential Exposure/ Loss for Commercial Buildings (x\$1,000)	Number of Critical Facilities	Potential Exposure for Critical Facilities (x\$1,000)
Coastal Storm / Erosion	0	0	0	0	0	0	0
Dam Failure	14,512	3,686	1,037,609	135	605,030	123	325,258
Earthquake (Annualized Loss - Includes shaking, liquefaction and landslide components)	168,254*	60,561*	17,047,922*	2,177*	9,756,661*	1,554*	7,942,838*
Flood (Loss)							
100 Year	7,276	3,661	1,030,572	137	613,993	107	629,073
500 Year	8,950	4,426	1,245,919	151	676,737	117	632,685
Rain-Induced Landslide							
High Risk	9,130	3,573	1,005,800	93	416,798	35	12,657
Moderate Risk	23,197	4,188	1,178,922	89	398,871	67	213,940
Tsunami	5,154	95	26,743	0	0	5	768
Wildfire / Structure Fire							
Fire Regime II & IV	88,262	27,785	7,821,478	12,481	4,368,416	1,618	7,702,078

* Represents 500-year earthquake value under three earthquake scenarios (shake only, shake and liquefaction, and shake and landslide).

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After reviewing the localized hazard maps and exposure/loss table above, the following hazards were identified by the County LPG as their top five.

- **Fire**
- **Hazardous Materials Release**
- **Flood**
- **Earthquake**
- **Manmade Hazards**

5.21.1 Capabilities Assessment

The LPG identified current capabilities available for implementing hazard mitigation activities. The Capability Assessment (Assessment) portion of the jurisdictional mitigation plan identifies administrative, technical, legal and fiscal capabilities. This includes a summary of departments and their responsibilities associated to hazard mitigation planning as well as codes, ordinances, and plans already in place associated to hazard mitigation planning. The second part of the Assessment provides the County's fiscal capabilities that may be applicable to providing financial resources to implement identified mitigation action items.

5.21.2 Existing Institutions, Plans, Policies and Ordinances

The following is a summary of existing departments in the County and their responsibilities related to hazard mitigation planning and implementation, as well as existing planning documents and regulations related to mitigation efforts within the community. The administrative and technical capabilities of the County, as shown in Table 5.21-2, provides an identification of the staff, personnel, and department resources available to implement the actions identified in the mitigation section of the Plan. Specific resources reviewed include those involving technical personnel such as planners/engineers with knowledge of land development and land management practices, engineers trained in construction practices related to building and infrastructure, planners and engineers with an understanding of natural or manmade hazards, floodplain managers, surveyors, personnel with GIS skills and scientists familiar with hazards in the community.

- **San Diego County Planning Development Services**

Maintain and protect public health, safety and well-being. Preserve and enhance the quality of life for County residents by maintaining a comprehensive general plan and zoning ordinance, implementing habitat conservation programs, ensuring regulatory conformance and performing comprehensive community outreach.

Advanced Planning Division: Provides land use and environmental review, maintains a comprehensive general plan and zoning ordinance, issues land use and building permits, and enforces building and zoning regulations. It is also responsible for long-range planning through development and implementation of a comprehensive County General Plan.

Building Division: Review site and building plans for compliance with all applicable codes.

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Code Compliance Division: Enforces building, grading, zoning, brushing and clearing, junk, graffiti, signs, abandoned vehicle complaints and noise control.

Land Development Division: Provides engineering and review services for construction and development projects throughout the unincorporated areas of San Diego County.

Project Planning Division: reviews “discretionary” projects. Those are projects that builders and homeowners cannot do “by right,” but which may be approved by PDS’s director, the Zoning Administrator, the Planning Commission or the Board of Supervisors if the projects meet certain conditions. Discretionary projects include lot splits, major subdivisions and conditionally-permitted uses. They also process applicants’ requests for General Plan Amendments and Zoning changes.

- **San Diego County Department of Public Works**

Preserve, enhance and promote quality of life and public safety through the responsible development of reliable and sustainable infrastructure and services.

Land Development Division: Provides engineering and review services for construction and development **projects throughout the unincorporated areas of San Diego County. Services such as Stormwater, Flood** Control, Map Processing, Cartography, Surveys, the Geographic and Land Information Systems and dealing with land development issues are the daily job of this division. The division processes more than 5,000 permits each year.

Transportation Division: Roads Section is the most visible part of DPW, responding to requests for services ranging from pothole repair to tree trimming. Traffic Engineering provides traffic management and determines the need for stop signs and traffic lights. Route Locations updates the County’s General Plan Circulation Element, provides transportation planning support and more. County Airports include eight unique facilities scattered throughout the area. McClellan-Palomar Airport provides commercial service to Los Angeles and Phoenix; Ramona Airport is home to the busiest aerial firefighting base in the USA; and, the County Sheriff’s air force, ASTREA, is based at Gillespie Field.

Engineering Services Division: The division includes Wastewater, Flood Control, Design Engineering, Environmental Services, Construction Engineering, Materials Lab, Project Management and Flood Control Engineering and Hydrology. The Director of Public Works has assigned the Deputy Director of Engineering Services as the County Engineer and Flood Control Commissioner.

Management Services Division: This division provides a variety of services to department employees and the public. It includes Personnel, Financial Services, Communications, Recycling, Inactive Landfills and Management Support. Special Districts serve small areas in unincorporated areas providing a variety of services to residents in rural areas.

- **San Diego County Housing & Community Development**

Improve the quality of life in our communities – helping needy families find safe, decent and affordable housing and partnering with property owners to increase the supply and availability of

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affordable housing. The Department provides many valuable services to both property owners and tenants and strives to create more livable neighborhoods that residents are proud to call home.

Key service programs include: improving neighborhoods by assisting low-income residents, increasing the supply of affordable, save housing and rehabilitating both business and residential properties in San Diego County. They serve the communities of: Chula Vista, Coronado, Del Mar, El Cajon, Escondido, Imperial Beach, Lemon Grove, Poway, San Marcos, Santee, Solana Beach, Vista, and the unincorporated areas of San Diego County.

The Community Development Block Grant Program (CDBG) provides funding to agencies or businesses that provide a benefit to low and moderate income persons, prevent or eliminate slums and blight, or meet needs having a particular urgency.

In addition to funding housing and shelter programs, the County also allocates grant funds toward various community improvements in the Urban County area. These include Developer Incentive programs, Housing Opportunity for Persons with AIDS and the Emergency Solutions Grant program. Participating cities, community residents, nonprofit organizations and other county departments may submit grant proposals.

- County of San Diego Emergency Medical Services (EMS)

Mission: To ensure that all residents of and visitors to San Diego County receive timely and high quality emergency medical services, specialty care, prevention services, disaster preparedness and response. Emergency Medical Services (EMS) is a branch of the Health and Human Services Agency's Public Health Services. It is the 'local EMS agency' (LEMSA) as defined in California law.

Part of San Diego County EMS is the Disaster Medical Health Emergency Preparedness unit. This unit coordinates with emergency management agencies, community organizations, medical providers, prehospital provider agencies (fire/EMS), hospitals, clinics, skilled nursing facilities, businesses and other partners in developing public health and disaster preparedness by dissemination of risk assessments, trainings and public health guidance.

- County of San Diego Office of Emergency Services

The Office of Emergency Services (OES) coordinates the overall county response to disasters. OES is responsible for alerting and notifying appropriate agencies when disaster strikes; coordinating all agencies that respond; ensuring resources are available and mobilized in times of disaster; developing plans and procedures for response to and recovery from disasters; and developing and providing preparedness materials for the public.

Function: To protect life and property within the San Diego County Operational Area in the event of a major emergency or disaster by: 1) Alerting and notifying appropriate agencies when disaster strikes; 2) Coordinating all Agencies that respond; 3) Ensuring resources are available and mobilized in times of disaster; 4) Developing plans and procedures for response to and recovery from disasters and 5) Developing and providing preparedness materials for the public.

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- County of San Diego Sheriff's Department

The San Diego County Sheriff's Department is the chief law enforcement agency in San Diego County. The department is comprised of approximately 4,000 employees, both sworn officers and professional support staff. The department provides general law enforcement, detention and court services for the people of San Diego County in a service area of approximately 4,200 square miles. In addition, the department provides specialized regional services to the entire county, including the incorporated cities and the unincorporated areas of the county.

The San Diego County Sheriff's Department provides contract law enforcement services for the cities of Del Mar, Encinitas, Imperial Beach, Lemon Grove, Poway, San Marcos, Santee, Solana Beach and Vista. In these cities the Sheriff's Department serves as their police department, providing a full range of law enforcement services including patrol, traffic and investigative services.

In the unincorporated (non-city) areas, the Sheriff's Department provides generalized patrol and investigative services. The California Highway Patrol has the primary jurisdiction for traffic services in unincorporated areas.

The San Diego County Sheriff's Department operates seven detention facilities. Male arrestees are booked at the San Diego Central Jail and Vista Detention Facility, while female arrestees are booked at the Las Colinas and Vista Detention Facilities. The remaining jails house inmates in the care of the Sheriff.

- California Department of Forestry and Fire Protection

CalFIRE is an emergency response and resource protection department that responds to more than 5,600 wildland fires that burn over 172,000 acres in the State each year. In addition, department personnel respond to more than 350,000 other emergency calls, including structure fires, automobile accidents, medical aid, swift water rescues, civil disturbance, search and rescue, floods, and earthquakes. CalFIRE is the State's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CalFIRE has joined with Federal and local agencies to form a statewide mutual aid system. This system insures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction. CalFIRE is responsible for wildland fire protection within the District's State Responsibility Areas, even though the Fire District is the first responder to an incident.

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**Table 5.21-2
County of San Diego: Administrative and Technical Capacity**

Staff/Personnel Resources	Y/N	Department/Agency and Position
A. Planner(s) or engineer(s) with knowledge of land development and land management practices	Y	Department of Planning & Land Use (DPLU)/ Lead Planner
B. Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Y	DPLU/Building Inspectors
C. Planners or Engineer(s) with an understanding of natural and/or manmade hazards	Y	
D. Floodplain manager	Y	
E. Surveyors	Y	DPLU & Department of Public Works (DPW)/ Surveyor, Lead
F. Staff with education or expertise to assess the community's vulnerability to hazards	Y	
G. Personnel skilled in GIS and/or HAZUS	Y	DPLU GIS Manager and DPW GIS Manager
H. Scientists familiar with the hazards of the community	Y	County Science Advisory Board
I. Emergency manager	Y	Office of Emergency Services / Emergency Services Coordinator
J. Grant writers	N	Departments determine their own level of service.

The legal and regulatory capabilities of the County are shown in Table 5.21-3, which presents the existing ordinances and codes that affect the physical or built environment of the County. Examples of legal and/or regulatory capabilities can include: the County's building codes, zoning ordinances, subdivision ordinances, special purpose ordinances, growth management ordinances, site plan review, general plans, capital improvement plans, economic development plans, emergency response plans, and real estate disclosure plans.

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Table 5.21-3
County of San Diego: Legal and Regulatory Capability

Regulatory Tools (ordinances, codes, plans)	Local Authority (Y/N)	Does State Prohibit (Y/N)
A. Building code	Y	N
B. Zoning ordinance	Y	N
C. Subdivision ordinance or regulations	Y	N
D. Special purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Y	N
E. Growth management ordinances (also called "smart growth" or anti-sprawl programs)	Y	N
F. Site plan review requirements	Y	N
G. General or comprehensive plan	Y	N
H. A capital improvements plan	Y	N
I. An economic development plan	Y	
J. An emergency response plan	Y	N
K. A post-disaster recovery plan	Y	
L. A post-disaster recovery ordinance	N	
M. Real estate disclosure requirements	Y	N

5.21.3 Fiscal Resources

Table 5.21-4 shows specific financial and budgetary tools available to the County such as community development block grants; capital improvements project funding; authority to levy taxes for specific purposes; fees for water, sewer, gas, or electric services; impact fees for homebuyers or developers for new development; ability to incur debt through general obligations bonds; and withholding spending in hazard-prone areas.

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Table 5.21-4
County of San Diego: Fiscal Capability

Financial Resources	Accessible or Eligible to Use (Yes/No)
A. Community Development Block Grants (CDBG)	Yes
B. Capital improvements project funding	Yes
C. Authority to levy taxes for specific purposes	Yes
D. Fees for water, sewer, gas, or electric service	Yes
E. Impact fees for homebuyers or developers for new developments/homes	Yes
F. Incur debt through general obligation bonds	Yes
G. Incur debt through special tax and revenue bonds	Yes
H. Yes Incur debt through private activity bonds	Yes
I. Withhold spending in hazard-prone areas	Yes

5.21.4 Goals, Objectives and Actions

Listed below are the County's specific hazard mitigation goals, objectives and related potential actions. For each goal, one or more objectives have been identified that provide strategies to attain the goal. Where appropriate, the County has identified a range of specific actions to achieve the objective and goal.

The goals and objectives were developed by considering the risk assessment findings, localized hazard identification and loss/exposure estimates, and an analysis of the jurisdiction's current capabilities assessment. These preliminary goals, objectives and actions were developed to represent a vision of long-term hazard reduction or enhancement of capabilities. To help in further development of these goals and objectives, the LPG compiled and reviewed current jurisdictional sources including the County's planning documents, codes, and ordinances. In addition, County representatives met with consultant staff and/or OES to specifically discuss these hazard-related goals, objectives and actions as they related to the overall Plan. Representatives of numerous County departments involved in hazard mitigation planning, including Fire, Police, and Public Works provided input to the County LPG. The County LPG members were:

- Tom Amabile, County OES
- Dave Cammal, DEH
- Jason Batchelor, Planning and Development Services
- Gitanjali Shinde, DPW
- Lisa Prus, San Diego County Water Authority
- Donna Johnson, HHSA, EMS

Once developed, County staff submitted the plan to Governor's Office of Emergency Services and FEMA for approval. Once approved the plan will be taken to the Unified Disaster Council and then to the San Diego County Board of Supervisors for adoption.

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A public survey was posted on all participating agencies websites from March through July 2014. Over 500 responses were received. The survey results are in Appendix D. An email address was also provided on the webpage to allow the public to submit questions and/or suggestions. This email address was checked daily.

The following sections present the hazard-related goals, objectives and actions as prepared by the County's LPG in conjunction with the Hazard Mitigation Working Group, locally elected officials and residents.

5.21.4.1 Goals

The County of San Diego has developed the following 13 Goals for their Hazard Mitigation Plan (See Attachment A for Goals 12, and 13).

- Goal 1. Promote Disaster-resistant future development.
- Goal 2. Increase public understanding and support for effective hazard mitigation.
- Goal 3. Build and support local capacity and commitment to become less vulnerable to hazards.
- Goal 4. Enhance hazard mitigation coordination and communication with federal, state, local and tribal governments.
- “Reduce the possibility of damage and losses to existing assets, particularly people, critical facilities/infrastructure, and County-owned facilities, due to”:
- Goal 5. Dam Failure
- Goal 6. Earthquakes and Liquefaction
- Goal 7. Coastal Storm/Erosion/Tsunami
- Goal 8. Landslides
- Goal 9. Floods
- Goal 10. Structural Fire/Wildfire
- Goal 11. Extreme Weather and Drought
- Goal 12. Manmade Hazards
- Goal 13. Hazardous Materials Release

5.21.4.2 Objectives and Actions

The County of San Diego developed the following broad list of objectives and actions to assist in the implementation of each of their 11 identified goals. The County of San Diego developed objectives to assist in achieving their hazard mitigation goals. For each of these objectives, specific actions were developed

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that would assist in their implementation. A discussion of the prioritization and implementation of the action items is provided in Section 5.21.5.

Goal 1: Promote disaster-resistant future development.		New, Existing or Both
<i>Objective 1.A: Facilitate the development or updating of general plans and zoning ordinances to limit development in hazard areas.</i>		
Action 1.A.1	Update General Plan as necessary.	Both
Action 1.A.2	Attract and retain qualified, professional and experienced staff.	Both
Action 1.A.3	Continue to identify high hazard areas using GIS.	Both
<i>Objective 1.B: Facilitate the adoption of building codes that protect existing assets and restrict new development in hazard areas.</i>		
Action 1.B.1	Review Codes as necessary.	New
<i>Objective 1.C: Facilitate consistent enforcement of general plans, zoning ordinances, and building codes.</i>		
Action 1.C.1	Staff enforcement personnel to a level to ensure compliance.	Both
Action 1.C.2	Develop and coordinate permits for all agencies.	Both
Action 1.C.3	Continue to utilize multi-agency permitting and enforcement team.	Both
<i>Objective 1.D: Limit future development in hazardous areas</i>		
Action 1.D.1	Development should be in harmony with existing topography.	Both
Action 1.D.2	Development patterns should respect environmental characteristics.	New
Action 1.D.3	Clustering should be encouraged.	New
Action 1.D.4	Development should be limited in areas of known geologic hazards.	New
Action 1.D.5	Development in floodplains shall be limited to protect lives and property.	New
Action 1.D.6	High fire hazard areas shall have adequate access for emergency vehicles.	Both
<i>Objective 1.E: Address identified data limitations regarding the lack of information about new development and build-out potential in hazard areas.</i>		
Action 1.E.1	Continue to utilize Geographic Information Systems (GIS) capabilities to identify hazards.	Both
Action 1.E.2	Continue to develop and update data sets that are necessary to test hazard scenarios and mitigation tools.	Both
<i>Objective 1.F: Increase public understanding, support and demand for hazard mitigation for new developments.</i>		
Action 1.F.1	Continue to gain public acceptance for avoidance policies in high hazard areas.	Both
Action 1.F.2	Continue public education efforts to publicize and adopt the appropriate hazard mitigation measures.	Both
Action 1.F.3	Help create demand for hazard resistant construction and site planning.	Both

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Goal 2: Increase public understanding and support for effective hazard mitigation.		New, Existing or Both
<i>Objective 2.A: Educate the public to increase awareness of hazards and opportunities for mitigation actions.</i>		
Action 2.A.1	Publicize and encourage the adoption of appropriate hazard mitigation actions.	Both
Action 2.A.2	Continue to provide information to the public on the County website.	Both
Action 2.A.3	Heighten public awareness of hazards by using the County Communications Office.	Both
Action 2.A.4	Gain public acceptance for avoidance policies in high hazard areas.	Both
Action 2.A.5	Identify hazard specific issues and needs.	Both
Action 2.A.6	Help create demand for hazard resistant construction and site planning.	Both
Action 2.A.7	Promote partnerships between the state, counties, local and tribal governments to identify, prioritize and implement mitigation actions.	Both
Action 2.A.8	Promote County's "Know Your Hazards" app.	Both
<i>Objective 2.B: Promote partnerships between the state, counties, local and tribal governments to identify, prioritize, and implement mitigation actions.</i>		
Action 2.B.1	Develop, maintain and improve lasting partnerships.	Both
Action 2.B.2	Support the County Fire Safe Council.	Both
Action 2.B.3	Promote cooperative vegetation Management Programs that incorporate hazard mitigation.	Both
<i>Objective 2.C: Promote hazard mitigation in the business community.</i>		
Action 2.C.1	Increase awareness and knowledge of hazard mitigation principles and practices.	Both
Action 2.C.2	Encourage businesses to develop and implement hazard mitigation actions.	Both
Action 2.C.3	Identify hazard-specific issues and needs.	Both
<i>Objective 2.D: Monitor and publicize the effectiveness of mitigation actions implemented countywide.</i>		
Action 2.D.1	Continue to use the County website to publicize mitigation actions.	Both
Action 2.D.2	Continue to create marketing campaigns.	Both
Action 2.D.3	Continue to determine mitigation messages to convey.	Both
Action 2.D.4	Continue to establish budget and identify funding sources for mitigation outreach.	Both
Action 2.D.5	Continue to develop and distribute brochures, CDs and other publications.	Both
<i>Objective 2.E: Provide education on hazardous conditions.</i>		
Action 2.E.1	Continue to support public and private sector symposiums.	Both
Action 2.E.2	Coordinate production of brochures, informational packets and other handouts.	Both
Action 2.E.3	Develop partnerships with the media on hazard mitigation.	Both

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Goal 3: Build and support local capacity and commitment to become less vulnerable to hazards.		New, Existing or Both
<i>Objective 3.A: Increase awareness and knowledge of hazard mitigation principles and practice among local officials.</i>		
Action 3.A.1	Use County Communications Office/County News Center to promote mitigation actions.	Both
Action 3.A.2	Conduct meetings with key elected officials to determine local issues and concerns.	Both
Action 3.A.3	Continuously demonstrate the importance of pre-disaster mitigation planning to the Board of Supervisors and other public officials.	Both
<i>Objective 3.B: Develop hazard mitigation plan and provide technical assistance to implement plan.</i>		
Action 3.B.1	Coordinate the update of the multi-jurisdictional plan.	Both
Action 3.B.2	Continue to have the County Working Group update and monitor the plan.	Both
<i>Objective 3.C: Limit growth and development in hazardous areas.</i>		
Action 3.C.1	Update GIS mapping to identify hazardous areas.	Both
Action 3.C.2	Continue to enforce trespassing regulations in high-risk areas.	Both
Action 3.C.3	Update General Plan and zoning regulations to reflect hazardous areas.	Both
Action 3.C.4	Support transfer of development rights in hazard prone areas.	Both
<i>Objective 3.D: Management of wildland vegetative communities to promote less hazardous conditions.</i>		
Action 3.D.1	Continue to use GIS to inventory by type and vegetation age class.	Both
Action 3.D.2	Continue to define target class ranges.	Both
Action 3.D.3	Continue to develop partnerships within the communities to fix age class ranges.	Both
<i>Objective 3.E: Improve the County's ability to manage in pre and post-disaster scenarios as well as respond effectively during the event.</i>		
Action 3.E.1	Train multiple staff members for each position in the Op Area EOC	Both

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Goal 4: Enhance hazard mitigation coordination and communication with federal, state, local and tribal governments.		New, Existing or Both
<i>Objective 4.A: Establish and maintain closer working relationships with state agencies, local and tribal governments.</i>		
Action 4.A.1	Continue the program of multi-jurisdictional/multi-functional training and exercises to enhance hazard mitigation.	Both
Action 4.A.2	Leverage resources and expertise that will further hazard mitigation efforts.	Both
Action 4.A.3	Update the multi-jurisdictional/multi-hazard mitigation plan to include tribal governments and special districts.	Both
Action 4.A.4	Maintain multi-jurisdictional/multi-functional training and exercises to enhance hazard mitigation.	Both
<i>Objective 4.B: Encourage other organizations to incorporate hazard mitigation activities.</i>		
Action 4.B.1	Continue to encourage tribal governments to become part of the HIRT JPA.	Both
Action 4.B.2	Establish and maintain lasting partnerships.	Both
Action 4.B.3	Continue to streamline policies to eliminate conflicts and duplication of effort.	Both
<i>Objective 4.C: Improve the County's capability and efficiency at administering pre- and post-disaster mitigation.</i>		
Action 4.C.1	Maintain consistency with the State in administering recovery programs.	Both
Action 4.C.2	Continue to work to establish a requirement that all hazard mitigation projects submitted to the State must be reviewed by the County.	Both
Action 4.C.3	Continue to improve coordination with the State Hazard Mitigation Office in dealing with local issues.	Both
<i>Objective 4.D: Support a coordinated permitting activities process.</i>		
Action 4.D.1	Develop notification procedures for all permits that support affected agencies.	Both
Action 4.D.2	Continue to streamline policies to eliminate conflicts and duplication of effort.	Both
Action 4.D.3	Continue to exchange resources and work with local and regional partners.	Both
<i>Objective 4.E: Coordinate recovery activities while restoring and maintaining public services.</i>		
Action 4.E.1	Maintain two damage assessment teams.	Both
Action 4.E.2	Maintain activation and reporting procedures for the damage assessment teams.	Both

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Goal 5: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>dam failure</u>.		New, Existing or Both
<i>Objective 5.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to dam failure</i>		
Action 5.A.1	Update dam inundation plans, at a minimum every ten years.	Both
Action 5.A.2	Continue to participate in community awareness meetings	Both
Action 5.A.3	Continue to develop and distribute printed publications to the communities concerning hazards.	Both
<i>Objective 5.B: Protect existing assets with the highest relative vulnerability to the effects of a dam failure.</i>		
Action 5.B.1	Continue to identify hazard-prone structures.	Existing
Action 5.B.2	Continue to construct barriers around structures.	Both
Action 5.B.3	Encourage structural retrofitting.	Existing
<i>Objective 5.C: Coordinate with and support existing efforts to mitigate dam failure (e.g., US Army Corps of Engineers, US Bureau of Reclamation, and California Department of Water Resources).</i>		
Action 5.C.1	Continue to revise development ordinances to mitigate effects of development on wetland areas.	Both
Action 5.C.2	Incorporate and maintain valuable wetlands in open space preservation programs.	Both
Action 5.C.3	Review and revise, as necessary, sediment and erosion control regulations.	Both
<i>Objective 5.D: Protect floodplains from inappropriate development.</i>		
Action 5.D.1	Strengthen existing development regulations to discourage land uses and activities that create hazards.	New
Action 5.D.2	Plan and zone for open space, recreational, agricultural, or other low-intensity uses within floodway fringes.	New
Goal 6: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>earthquakes and liquefaction</u>.		New, Existing or Both
<i>Objective 6.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to earthquakes.</i>		
Action 6.A.1	Update Building Codes to reflect current earthquake standards.	Both
Action 6.A.2	Continue to participate in community awareness meetings.	Both
Action 6.A.3	Continue to develop and distribute printed publications to the communities concerning hazards.	Both

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Goal 6: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>earthquakes and liquefaction</u>.		New, Existing or Both
<i>Objective 6.B: Protect existing assets with the highest relative vulnerability to the effects of earthquakes.</i>		
Action 6.B.1	Continue to identify hazard-prone structures through GIS modeling.	Both
Action 6.B.2	Ensure new construction critical facilities are designed to function after a major earthquake.	New
Action 6.B.3	Continue to study ground motion, landslide, and liquefaction.	Both
<i>Objective 6.C: Coordinate with and support existing efforts to mitigate earthquake hazards.</i>		
Action 6.C.1	Identify projects for pre-disaster mitigation funding.	Both
Action 6.C.2	Continue to implement an ongoing public seismic risk assessment program.	Both
Action 6.C.3	Continue to collaborate with Federal, State and local agencies' mapping efforts.	Both
<i>Objective 6.D: Address identified data limitations regarding the lack of information about the relative vulnerability of assets from earthquakes.</i>		
Action 6.D.1	Continue to assess countywide utility infrastructure with regard to earthquake risk.	Both
Action 6.D.2	Develop and implement an incentive program for seismic retrofits.	Existing
Action 6.D.3	Continue to encourage the public to prepare and maintain a 3-day preparedness kit for home and work.	Both
<i>Objective 6.E: Protect existing assets with the highest relative vulnerability to the effects of liquefaction.</i>		
Action 6.E.1	Identify hazard-prone structures through GIS modeling.	Existing
Action 6.E.2	Build critical facilities that function after a major earthquake.	New
Action 6.E.3	Study ground motion, landslide and liquefaction.	Both
Goal 7: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>coastal storm/erosion/tsunami</u>.		New, Existing or Both
<i>Objective 7.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to coastal storms/erosion.</i>		
Action 7.A.1	Continue to coordinate with coastal cities to develop a comprehensive plan.	Both
Action 7.A.2	Participate in community awareness meetings.	Both
Action 7.A.3	Develop and distribute printed publications to the communities concerning hazards.	Both

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Goal 7: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>coastal storm/erosion/tsunami</u>.		New, Existing or Both
<i>Objective 7.B: Protect existing assets with the highest relative vulnerability to the effects of coastal storms/erosion.</i>		
Action 7.B.1	Retrofit structures to strengthen resistance to damage.	Existing
Action 7.B.2	Continue to encourage the public to prepare and maintain a 3-day preparedness kit for home and work.	Both
Action 7.B.3	Seek pre-disaster mitigation funding for coastal erosion projects.	Both
<i>Objective 7.C: Coordinate with and support existing efforts to mitigate severe coastal storms/erosion.</i>		
Action 7.C.1	Continue to review and update plans that would include coordination with cities, special districts and county departments.	Both
Action 7.C.2	Continue to streamline policies to eliminate conflicts and duplication of effort.	Both
Action 7.C.3	Continue to develop and publish evacuation procedures to the public.	Both
<i>Objective 7.D: Address identified data limitations regarding the lack of information about the relative vulnerability of assets from coastal storms/erosion.</i>		
Action 7.D.1	Using GIS continue to identify hazard-prone structures.	Both
Action 7.D.2	Continue to incorporate information and recommendations from coastal cities into the hazard mitigation plan.	Both

Goal 8: Reduce the possibility of damage and losses to existing assets, including people, critical facilities /infrastructure, and public facilities due to <u>landslide</u>.		New, Existing or Both
<i>Objective 8.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to landslide.</i>		
Action 8.A.1	Continue to identify potential areas based upon historical data.	Both
Action 8.A.2	Continue to participate in community awareness meetings.	Both
Action 8.A.3	Continue to develop and distribute printed publications to the communities concerning hazards.	Both
<i>Objective 8.B: Protect existing assets with the highest relative vulnerability to the effects of landslide.</i>		
Action 8.B.1	Study and improve storm drains for landslide prone areas.	Both
Action 8.B.2	Develop, adopt and enforce effective building codes and standards.	New
Action 8.B.3	Seek pre-disaster mitigation funding for landsides prevention projects.	Both
<i>Objective 8.C: Coordinate with and support existing efforts to mitigate landslide.</i>		
Action 8.C.1	Continue to review and update plans that would include coordination with cities, special districts and county departments.	Both

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Goal 8: Reduce the possibility of damage and losses to existing assets, including people, critical facilities /infrastructure, and public facilities due to <u>landslide</u>.		New, Existing or Both
Action 8.C.2	Continue to streamline policies to eliminate conflicts and duplication of effort.	Both
Action 8.C.3	Develop and publish evacuation procedures to the public.	Both
<i>Objective 8.D: Address identified data limitations regarding the lack of information about the relative vulnerability of assets from landslide.</i>		
Action 8.D.1	Identify hazard-prone structures through GIS modeling.	Both
Action 8.D.2	Implement hazard awareness program.	Both

Goal 9: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>floods</u>.		New, Existing or Both
<i>Objective 9.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to floods.</i>		
Action 9.A.1	Continue to review and compare existing flood control standards, zoning and building requirements.	Both
Action 9.A.2	Identify flood-prone areas by using GIS.	Both
Action 9.A.3	Adopt policies that discourage growth in flood-prone areas.	Both
<i>Objective 9.B: Protect existing assets with the highest relative vulnerability to the effects of floods within the 100-year floodplain.</i>		
Action 9.B.1	Assure adequate funding to restore damaged facilities to 100-year flood design.	Both
Action 9.B.2	Update storm water system plans and improve storm water facilities in high-risk areas.	Both
Action 9.B.3	Plan for evacuation in case of major hazard event.	Both
<i>Objective 9.C: Coordinate with and support existing efforts to mitigate floods (e.g., US Army Corps of Engineers, US Bureau of Reclamation, and California Department of Water Resources).</i>		
Action 9.C.1	Develop a flood control strategy that ensures coordination with Federal, State and local agencies.	Both
Action 9.C.2	Improve hazard warning and response planning.	Both
<i>Objective 9.D: Minimize repetitive losses caused by flooding.</i>		
Action 9.D.1	Identify those communities that have recurring losses.	Both
Action 9.D.2	Develop project proposals to reduce flooding and improve control in flood prone areas.	Both
Action 9.D.3	Acquire properties, when feasible, on floodway to prevent development.	Both

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Goal 9: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>floods</u>.		New, Existing or Both
<i>Objective 9.D: Minimize repetitive losses caused by flooding.</i>		
Action 9.D.4	Seek pre-disaster mitigation funding.	Both
<i>Objective 9.E: Address perceived data limitations regarding the lack of information about the relative vulnerability of assets from flooding.</i>		
Action 9.E.1	Continue to encourage the public to prepare and maintain a 3-day preparedness kit for home and work.	Both
Action 9.E.2	Increase participation and improve compliance with the National Flood Insurance Program (NFIP).	Both
Action 9.E.3	Develop and implement hazard awareness program.	Both

Goal 10: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>structural fire/wildfire</u>.		New, Existing or Both
<i>Objective 10.A: Develop a comprehensive approach to reducing the possibility of damage and losses due to structural fire/wildfire.</i>		
Action 10.A.1	Update the County Consolidated Fire Code as necessary.	Both
Action 10.A.2	Develop model Weed Abatement and Fuel Modification Ordinances.	Both
Action 10.A.3	Utilize GIS as an information tool.	Both
Action 10.A.4	Coordinate with and support existing efforts to mitigate structural fire/wildfire.	Both
Action 10.A.5	Continue to develop partnerships for a countywide vegetation management program.	Both
<i>Objective 10.B: Protect existing assets with the highest relative vulnerability to the effects of structural fire/wildfire.</i>		
Action 10.B.1	Enforce standardized Defensible Space Clearance distances.	Both
Action 10.B.2	Work with community-based groups to pilot chipping programs.	Both
Action 10.B.3	Continue to research options to provide low cost insurance to cover landowners who allow prescribed burning on their lands.	Both
<i>Objective 10.C: Coordinate with and support existing efforts to mitigate structural fire/wildfire.</i>		
Action 10.C.1	Establish a continuing wildland fire technical working group.	Both
Action 10.C.2	Continue to develop partnerships for a countywide vegetation management program.	Both

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Goal 10: Reduce the possibility of damage and losses to existing assets, including people, critical facilities/infrastructure, and public facilities due to <u>structural fire/wildfire</u>.		New, Existing or Both
<i>Objective 10.C: Coordinate with and support existing efforts to mitigate structural fire/wildfire.</i>		
Action 10.C.3	Report annually to the Board of Supervisors on the progress of fire mitigation strategies.	Both
<i>Objective 10.D: Address identified data limitations regarding the lack of information about the relative vulnerability of assets from structural fire/wildfire.</i>		
Action 10.D.1	Identify Urban/wildland fire interface areas.	Both
Action 10.D.2	Use GIS to map fire risk areas.	Both
Action 10.D.3	Implement public education program to address fire dangers and corrective measures.	Both

Goal 11: Reduce the possibility of damage and losses to existing assets, including people, critical facilities /infrastructure, and public facilities due to <u>extreme weather and drought</u>.		New, Existing or Both
<i>Objective 11.A: Educate the community about drought, its potential impacts and individual mitigation techniques that they can engage in to help prevent drought or reduce the impact of drought.</i>		
Action 11.A.1	Encourage residents to adopt drought tolerant landscaping or xeriscape practices.	Both
Action 11.A.2	Promote use of reclaimed water for all landscaping efforts.	Both
Action 11.A.3	Support groundwater recycling efforts.	Both
<i>Objective 11.B: Protect vulnerable populations from the effects of extreme heat</i>		
Action 11.B.1	Support regional efforts to prepare for excessive heat events	Both
Action 11.A.2	Participate in “Excessive Heat Emergency Awareness” events and exercise heat emergency plans as established by HHSA, AIS, EMS, and PHS.	Both
Action 11.A.3	Continue to provide “Cool Zones” during excessive heat events.	Both

5.21.5 Prioritization and Implementation of Action Items

Once the comprehensive list of jurisdictional goals, objectives, and action items listed above was developed, the proposed mitigation actions were prioritized using STAPLEE criteria. This step resulted in a list of acceptable and realistic actions that address the hazards identified in each jurisdiction. This prioritized list of action items was formed by the LPG.

The prioritized actions below reflect progress in local mitigation efforts as well as changes in development.

The Disaster Mitigation Action of 2000 (at 44 CFR Parts 201 and 206) requires the development of an action plan that not only includes prioritized actions but one that includes information on how the prioritized

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Goals, Objectives and Actions

actions will be implemented. Implementation consists of identifying who is responsible for which action, what kind of funding mechanisms and other resources are available or will be pursued, and when the action will be completed.

The top 11 prioritized mitigation actions as well as an implementation strategy for each are:

Action Item #1: Update Operational Area Emergency Operational Plan and associated Annexes
Coordinating Individual/Organization: The Office of Emergency Services (OES) will work with the 18 incorporated cities and participating special districts to revise and update the Plan
Potential Funding Source: FEMA Grants/ General Funds for County and Cities.
Implementation Timeline: January 2019 – January 2020

Action Item #2: Develop and maintain public education and outreach programs related to actions residents can take to mitigate hazards they may face. (Annual defensible space education/outreach; terrorism prevention; erosion control, etc.)
Coordinating Individual/Organization: OES and County Communications Office (CCO)
Potential Funding Source: General Fund/Federal or State Grants
Implementation Timeline: January 2018 – January 2023

Action Item #3: Review the County Consolidated Fire Code annually and update as necessary
Coordinating Individual/Organization: Planning and Developmental Services and County Fire Authority
Potential Funding Source: General Fund/Federal or State Grants
Implementation Timeline: January 2018 - January 2023

Action Item #4: Streamline policies to eliminate conflicts and duplication of effort in regional planning efforts by coordinating emergency management activities with regional stakeholders by facilitating meetings on a regular basis with regional emergency managers, campus emergency managers, DOD partners, Voluntary Agencies Active in Disaster, and faith-based partners.
Coordinating Individual/Organization: OES, County Departments, local military, healthcare agencies and the 18 incorporated cities
Potential Funding Source: General Fund/Federal or State grants
Implementation Timeline: January 2018 – January 2023

Action Item #5: Publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region
Coordinating Individual/Organization: OES/PDS/County Fire Authority/CCO/County Technology Office (CTO)
Potential Funding Source: General Fund/Federal or State grants.
Implementation Timeline: January 2018 – January 2023

Action Item #6: Review Building Codes to reflect current earthquake standards annually and update as necessary
Coordinating Individual/Organization: Planning and Developmental Services
Potential Funding Source: General Fund/Federal or State Grants.

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Implementation Timeline:	January 2018 – January 2023
Action Item #7:	Support public and private sector symposiums that emphasize hazard mitigation planning
Coordinating Individual/Organization:	OES/County Departments/Cities/Private Sector
Potential Funding Source:	General Fund/Federal or State Grants
Implementation Timeline:	January 2018 – January 2023
Action Item #8:	Maintain multi-jurisdictional/multi-functional training and annual exercises to enhance hazard mitigation
Coordinating Individual/Organization:	OES/County Departments/All 18 Cities/appropriate Private Sector Agencies
Potential Funding Source:	Grant Funded
Implementation Timeline:	January 2018 – January 2023
Action Item #9:	Review and update annually regional emergency plans, Concept of Operation plans, protocols, and standard operational processes.
Coordinating Individual/Organization:	OES/appropriate county Departments/All 18 Cities/Special Districts
Potential Funding Source:	General Fund/Federal or State grants.
Implementation Timeline:	January 2018 – January 2023
Action Item #10:	Encourage the public to prepare and maintain a 3-day preparedness kit for home and work through outreach events, social media, paid media and earned media.
Coordinating Individual/Organization:	OES/CCO/CTO
Potential Funding Source:	General Fund/Federal or State grants
Implementation Timeline:	January 2018 – January 2023
Action Item #11:	Develop a Climate Action Plan.
Coordinating Individual/Organization:	Land Use and Environment Group/OES
Potential Funding Source:	General Fund/Federal or State grants
Implementation Timeline:	January 2018 – January 2023

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Plan Maintenance

This section of the Plan describes the formal process that will ensure that the Plan remains an active and relevant document. The plan maintenance process includes a schedule for monitoring and evaluating the Plan annually and producing a plan revision every five years. This section describes how the county and cities will integrate public participation throughout the plan maintenance process. Finally, this section includes an explanation of how jurisdictions intend to incorporate the mitigation strategies outlined in this plan into existing planning mechanisms such as the County Comprehensive Land Use Plan, Capital Improvement Plans, and Building Codes.

6.1 Monitoring, Evaluating and Updating the Plan

6.1.1 Plan Monitoring

The HMWG participants will be responsible for monitoring the plan annually for updates to jurisdictional goals, objectives, and action items. If needed, these participants will coordinate through the County OES to integrate these updates into the Plan. County OES will be responsible for monitoring the overall Plan for updates on an annual basis.

6.1.2 Plan Evaluation

The Plan is evaluated by County OES and by each participating jurisdiction annually to determine the effectiveness of programs, and to reflect changes in land development or programs that may affect mitigation priorities. This includes re-evaluation by HMWG leads (or their select jurisdictional representative) based upon the initial STAPLEE criteria used to draft goals, objectives, and action items for each jurisdiction. County OES and city representatives also review the goals and action items to determine their relevance to changing situations in the county, as well as changes in State or Federal regulations and policy. County OES and jurisdictional representatives review the risk assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. The coordinating organizations responsible for the various action items will report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised. Any updates or changes necessary will be forwarded to County OES for inclusion in further updates to the Plan. The HMWG and each Local Mitigation Planning Team meet annually to discuss the status of the Plan.

6.1.3 Plan Updates

Since the plan's original adoption in 2005 the HMWG has participated in an annual review. This process was continued after the adoption of the 2010 plan. The review details all mitigation actions that were deferred, begun, continued or completed during that calendar year. In the past five years there has been considerable progress made with the successful completion of the vast majority of the action items developed by the participating jurisdictions. Appendix C details the status of the action items from the 2010 plan.

This review process has been effective in identifying gaps and shortfalls in funding, support, and other resources. It has also allowed for the re-prioritization of specific actions as circumstances change. It allows each participating jurisdiction to maintain the plan as a living document. This review process has enabled the HMWG to improve the document by eliminating actions that have been completed, adding new actions that have been identified since the plans adoption and reprioritizing other actions to reflect new priorities

SECTION SIX

Plan Maintenance

and/or constraints. The negative side of this review process is that it is time consuming, pulling staff away from their day-to-day responsibilities.

County OES will continue to be the responsible agency for updates to the Plan. All HMWG participants will continue to be responsible to provide OES with jurisdictional-level updates to the Plan annually or when/if necessary as described above. Every five years the plan will be updated and submitted to Cal OES and FEMA for review.

6.1.4 Implementation through Existing Programs

County and local jurisdictions have implemented many of the recommended action items through existing programs and procedures. Participants use the Plan as a baseline of information on the natural hazards impacting their jurisdictions. They have also been able to refer to existing institutions, plans, policies and ordinances defined for each jurisdiction in Section 5 of the Plan (e.g., General Plan, Comprehensive Plan). Participants are incorporating the Hazard Mitigation Plan into their General Plans and/or Comprehensive Plans as those plans come up for review and revision.

6.1.5 Continued Public Involvement

The 2010 was posted on the Hazard Mitigation page of the San Diego County Office of Emergency Services webpage. The public was encouraged to comment on the plan online. Once approved, the revised plan will be posted on the hazard mitigation page of the County website. A dedicated email address is provided to the public to provide comments on the plan.

In addition, at the beginning of the revision process a survey was posted on all participating jurisdiction's webpages to determine the best way to meet the needs and desires of the community. The survey results are in Appendix D.

The participating jurisdictions and special districts continue to be dedicated to involving the public directly in the review process and updates of the Plan. A maintenance committee made up of a representative from County OES and a representative from each participating jurisdiction is responsible for monitoring, evaluating, and updating the Plan as described above. During all phases of plan maintenance the public will have the opportunity to provide feedback.

A copy of the Plan is available for review on the County OES website. Participating jurisdictions also have links from their website to the Plan. In addition, hard copies of the plan are catalogued and kept at all of the appropriate agencies in the county. The existence and location of these copies is also posted on the county website. To facilitate public comments, the site contains an email address for the public's use which is monitored on a daily basis by County OES. Any questions or comments received on this website are forwarded to the appropriate member(s) of the HMWG for their review and response. County OES also tracks these public comments on the plan.

A press release requesting public comments is also issued for each update, and after each evaluation. We are also using social media (Facebook, Twitter, etc.) to notify the public of any changes they should be aware of. These notifications direct people to the website where the public can review proposed changes. Coupled with the dedicated email address for comments, this provides the public a simple and easily accessible to allow them to express their concerns, opinions, or ideas about any updates/changes that are proposed to the Plan. The County OES will continue to be responsible for publicize any changes to the Plan and maintaining public involvement.

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APPENDIX A

Working Group Meetings

APPENDIX A: HAZARD MITIGATION WORKING GROUP MEETING AGENDAS AND SUMMARIES

Group Meeting #1: Wednesday February 11, 2014, 9:00 AM

Meeting Summary

Tom Amabile (TA) gave an introduction that discussed the working group goals. The group went around and identified themselves and their agencies. The audience consisted of representatives from the 18 incorporated cities, the County of San Diego and various local water agencies as well as from several fire protection districts. Special Districts represented were:

- Alpine Fire Protection District
- Lakeside Fire Protection District
- Padre Dam Municipal Water District
- Rancho Santa Fe Fire Protection District
- San Diego County Water Authority
- Sweetwater Authority
- Valley Center Water District
- Vista Irrigation District

TA gave a PowerPoint™ presentation discussing the goals of the San Diego County Multi-Jurisdiction Multi-Hazard Mitigation Plan (Plan), the objectives of DMA 2000, the hazard mitigation planning process and the steps involved in developing the Plan achieving the goals.

The presentation included a discussion of the methodology that will be used to revise the Plan for San Diego County. It was stressed that participation from special districts, especially fire protection districts and water districts was strongly encouraged and welcome.

As explained in the PowerPoint presentation the goals of the hazard mitigation planning process consists of:

1. Identifying
 - a. Risk of loss of life and property damage due to man-made and natural disasters
 - b. Options for mitigation to lower or eliminate those risks
 - c. Available resources and capabilities to implement mitigation actions
 - d. Risks to San Diego County:
 - i. Coastal storms/erosion
 - ii. Dam Failure
 - iii. Drought
 - iv. Earthquakes
 - v. Flooding
 - vi. Hazardous Materials\
 - vii. Landslides
 - viii. Terrorism
 - ix. Tsunamis

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APPENDIX A

Working Group Meetings

x. Wildfires

2. Planning Process

a. Basic Steps

- i. Establish planning area
 - a. Identify partnerships
 - i. Regional organizations
 - ii. Local governments
 - iii. Special Districts
 - iv. Tribal governments
- ii. Build the planning team
 - a. Identify Team Members
 - i. Board of Supervisors/City Councils
 - ii. Code Enforcement
 - iii. Community Development
 - iv. Fire
 - v. Law Enforcement
 - vi. Emergency Management
 - vii. Floodplain Administrators
 - viii. GIS
 - ix. Public Information
 - x. Public Works
 - xi. Special Districts
 - xii. Stormwater Management
 - xiii. Special Districts
 - xiv. Transportation
 - b. Each participating jurisdiction will have a local planning team
 - i. Focus on issues specific to that jurisdiction
 - ii. One or two members will also be part of the regional planning team
 - c. Responsibilities include:
 - i. Attend meetings
 - ii. Collect data
 - iii. Make decisions on the planning process and content
 - iv. Submit required worksheets
 - v. Review plan drafts
 - vi. Assist with coordination of public involvement and plan adoption
- iii. Create an outreach strategy
 - a. Three tiers
 - i. Planning Team
 - ii. Stakeholders

APPENDIX A

Working Group Meetings

- iii. General Public
- b. Successful Outreach
 - i. Informs and educates
 - ii. Invites interested parties to contribute
 - iii. Identifies conflicts
 - iv. Incorporated different perspectives
 - v. Provides data and information that improves the final plan
 - vi. Ensures transparency and builds trust
 - vii. Maximizes opportunities
- c. Outreach Methods
 - i. Community Events
 - ii. News articles
 - iii. Presentations to local governments
 - iv. Questionnaires/Surveys
 - v. Public forums
 - vi. Social media
 - vii. Community specific meetings
 - viii. Website
- d. Document the process
- iv. Review community capabilities
 - a. Existing authorities, policies, programs and resources
 - b. Core Capabilities
 - i. Planning
 - ii. Public information and warning
 - iii. Operational coordination
 - iv. Community resilience
 - v. Long-term vulnerability reduction
 - vi. Risk and disaster resilience assessment
 - vii. Threats and hazards identification
 - c. National Flood Insurance Program
 - d. Community Capabilities
 - i. Plans
 - ii. Studies
 - iii. Reports
 - iv. Technical Information
 - v. For each jurisdiction
- v. Conduct risk assessment
 - a. Describe hazards
 - b. Identify community assets
 - i. People
 - ii. Economic
 - iii. Built Environment
 - iv. Cultural resources

APPENDIX A

Working Group Meetings

- v. Future development
 - vi. Natural Environment
- c. Analyze Risk
 - i. Exposure Analysis
 - ii. Historical Analysis
 - iii. Scenario Analysis
 - iv. GIS Hazard Mapping
- d. Summarize vulnerability
- vi. Develop a mitigation strategy
 - a. Goals –What we want to achieve
 - b. Actions – Specific projects and activities to meet those goals\
 - c. Action Plan – Describes how mitigation actions will be implemented
 - d. Develop the Plan
 - i. Finalize goals and objectives
 - ii. Identify mitigation measures
 - iii. Evaluate mitigation measures
 - iv. Prioritize mitigation measures
 - e. Document the plan
- vii. Keep the plan current
- viii. Adopt the plan
- ix. Create a safe and resilient community
 - a. Focus on quality, not quantity
 - b. Develop strong messaging
 - c. Encourage local champions
 - d. Identify funding and assistance

The presentation also entailed an explanation of the benefits and requirements of participating in the Hazard Mitigation Plan process. The special districts were told that this was an excellent time for them to become engaged with the hazard mitigation planning process. Because the plan was set for revision, they could become part of the process and have their plans incorporated into the multi-jurisdictional plan by simply participating and developing a plan. TA went on to describe the benefits of having a plan, specifically the ability to apply for hazard mitigation grants. He explained that the grant process was competitive and having a hazard mitigation plan did not guarantee a grant award.

The schedule of work group meeting was discussed. The work group will meet monthly to begin with. The next meeting date was schedule for March 5, 2014. At that meeting all participating jurisdictions (cities, county and special districts) will begin the actual process of updating and revising the multi-jurisdictional hazard mitigation plan.

APPENDIX A

Working Group Meetings

Group Meeting #2: Thursday May 28, 2009, 10:00 AM

A G E N D A

Introductions

Schedule

GIS's Role in the Planning Process

Planning Process – Where Are We Now?

GIS – Assessing Risks – Step 1/Identify Hazards

What's Next?

Next Meeting – Time and Location

June 25, 2009 0900 – 1200

OES

Tom Amabile (TA) gave an introduction that discussed the working group goals. The group went around and identified themselves and their agencies. The audience consisted of representatives from the incorporated cities, the County of San Diego, various local water agencies and fire protection districts. Agencies represented at the meeting were:

City of Poway

City of El Cajon

City of La Mesa

City of Lemon Grove

City of San Diego

City of San Marcos

City of Vista

Alpine FPD

Lakeside FPD

Rancho Santa Fe FPD

San Miguel FPD

Padre Dam MWD

San Diego County Water Authority

Sweetwater Authority

Valley Center MWD

Vista Irrigation District

GIS' Role in the Planning Process

Geographic Information System (GIS) is essential for hazard mitigation planning. It can incorporate multiple and diverse data sources and provide an easily understood visual presentation of even the most complex data. GIS provides a modeling capability, allowing us to ask "What If" questions. Finally, it allows the data to be easily disseminated in the form of tables, maps, charts, etc.

It works by putting the available data in layers that can then be rectified and so they will overlay and allow queries to be run.

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Working Group Meetings

We need to identify all available data sources. There is a listing of sources in Appendix B of the current Hazmit plan. Please review them and if you have additional appropriate data files that are not currently being used for this project, please let Tom Amabile know so they can be incorporated in to the HAZUS modeling that will be done. If there are data layers identified that are no longer valid, please let Tom know that was well.

Planning Process

We have organized our resources by establishing a planning team, and are working towards assessing community support and engaging the public. Currently, we are assessing our risk. This is accomplished by identifying hazards and profiling them to assess likely hood of occurrence and potential severity. We can eliminate hazards with a low risk (little chance of occurrence or for damage from the event), those with little potential for mitigation and those that already have mitigation efforts underway.

We will look at events that have resulted in a Local Proclamation of Emergency, a Gubernatorial Proclamation or a Presidential Declaration. They will be categorized by:

- Type
- Date
- Location
- Expenditures
- Damages
- Description

We will also look at undeclared events looking for the same data above. Once that is complete we can inventory assets to determine their vulnerability to these hazards and identify potential loses.

Once that is complete we will develop the mitigation plan. To do this we will identify goals and objectives, establish and prioritize mitigation measures, prepare an implementation strategy and document the plan.

The final step will be to implement the plan. That will require adoption of the approved plan by all participating jurisdictions and implementation of plan recommendations. Each year we will evaluate the results and modify the recommendations to reflect completed tasks adding new tasks to the prioritized list as appropriate.

It is anticipated that we will begin the next revision of the complete plan in 2019.

APPENDIX A

Working Group Meetings

Assessing Risk

Hazards currently addressed in the plan are:

- Earthquakes
- Wildfires
- Flooding
- Landslide
- Drought
- Tsunami
- Hazardous materials
- Coastal storm/erosion
- Dam failure
- Terrorism

Potential additions to the 2015 plan are:

- Drought/Water Supply
- Extreme Heat
- Other extreme weather events

A discussion of the identified hazards and potential new hazards took place. The consensus was that we would merge liquefaction with earthquake and merge radioactive materials release with hazardous materials release. There will also be a new hazard listed to encompass potential impacts from climate change that was identified as “Extreme Weather/Drought”.

OES is finishing up a survey on Survey Monkey that will be released to the public by the end of March and will be available to them for six weeks (FEMA requires a minimum response time of four weeks). This will be the start of the Public Outreach effort. We will conduct the survey upfront, before making/finalizing the plan, so ideas/comments from the public can be incorporated into the planning process and the draft plan. Each jurisdiction is requested to provide a link to the survey on their website, to allow for as much public outreach as possible. The County of San Diego will issue a press release to notify the public and encourages each jurisdiction to do the same. The County’s press release will be made available to all participating jurisdictions.

What’s Next?

It is expected that each jurisdiction will, with the assistance of their local hazmit working group, begin to focus on aspects specific to their jurisdiction. Part of this process will be “Ground-truthing,” I.e., each individual jurisdiction must confirm the data being used is accurate and acceptable to them.

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APPENDIX A

Working Group Meetings

Part of this process will be to profile the hazards. While the County's GIS staff will model this, each city/special district will need to review the results to ensure they are appropriate for that jurisdiction.

Homework

Everyone is requested to:

Review the data matrix in Appendix B

Review the hazard maps

Review FEMA Local Mitigation Planning Handbook (on the CD provided last meeting. It is also available on line at:

<http://www.fema.gov/media-library/assets/documents/31598?id=7209>

Complete the 4 Worksheets form the handbook

Group Meeting #3: June 24, 2014,

A G E N D A

Introductions

Schedule

Mitigation Strategy

Goals,- Consistent with hazards identified

Goals from 2010 Plan

Actions

Local Plans and regulations

Structure/Infrastructure projects

Natural Systems protection

Education & Awareness programs

Preparedness Actions

Mitigating Actions

Action Prioritization

Implementation

Incorporate into existing plans & Policies

Integrate with other community objectives, using existing mechanisms.

Think pre and post-disaster mitigation

Updating Mitigation Strategy

Evaluate implementation progress

Explain changes in priorities

Communicating Mitigation Action Plan to the Public

What's Next ?

Run HAZUS analysis

Develop Maps and Tables

APPENDIX A

Working Group Meetings

Begin development of mitigation strategy
Homework
Review goals and objectives in 2010 plan
Begin update local goals, objectives and actions.

Next Meeting – August 26, 2014 10 AM

Meeting Summary

Tom Amabile gave an introduction that discussed the working group goals. Members went around the room and introduced themselves.

Tom Amabile reviewed the time-line for the project. He then reviewed the goals, objects and actions that will be listed in the plan;

Goals are guidelines that explain what you want to achieve. They must be consistent with the hazards identified.

Objectives connect actions to the goals, and

Actions are specific measurable projects and activities that help achieve the goal.

Mitigation actions which include changes to local plans and regulations, structure/infrastructure projects, natural systems protection and education and awareness programs.

Preparedness actions to reduce or eliminate long-term risk and lessen the need for preparedness and/or response resources in the future. These actions include mutual aid agreements, purchasing communications equipment and developing mass notification capabilities.

The **Action Plan** describes how mitigation actions will be prioritized and implemented.

Goals and Objectives identified in the current plan were presented. They are:

Reduce the possibility of damage and losses to existing assets due to geologic hazards

Reduce the possibility of damage and losses to existing assets due to structure fire/wildfire

Reduce the possibility of losses to existing assets due to flooding/dam failure

Increase public understanding and support for effective hazard mitigation

Improve hazard mitigation coordination and communication with federal, State, local and tribal governments

Reduce the possibility of damage and losses to existing assets due to geologic hazards

Reduce the possibility of damage and losses to existing assets due to structure fire/wildfire

Reduce the possibility of losses to existing assets due to flooding/dam failure

Increase public understanding and support for effective hazard mitigation

Improve hazard mitigation coordination and communication with federal, State, local and tribal governments

There was discussion regarding changing or modifying these goals and objectives. Each participating jurisdiction is free to modify them to meet their needs.

The process for identifying mitigation actions was discussed. It includes:

Review of the risk assessment

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Working Group Meetings

Capabilities assessment
Evaluation and prioritization of mitigation actions
Implementation
Updating mitigation strategy
Communicating the action plan to key officials and the public

Action Items

OES/County:

Run HAZUS analysis
Develop maps and tables.

All jurisdictions:

Begin development of Mitigation Strategy.

All other meetings between individual jurisdictions were conducted via telephone or in person between the city/special district and OES.

Group Meeting #4: September 16, 2014, A G E N D A

Introductions

Schedule

Survey results

Review of Hazards

Review of Over-arching Mitigation Goals

Development of Additional Goals

Homework Assignment

What's Next?

Meeting Summary

Tom Amabile gave an introduction that discussed the working group goals. Members went around the room and introduced themselves.

Tom Amabile reviewed the time-line for the project.

The results of the on-line survey were discussed:

534 people responded to the survey.

Carlsbad -	44	National City -	2
Coronado -	1	Oceanside -	14
Chula Vista -	31	Poway -	28
Del Mar -	28	San Diego -	69

APPENDIX A

Working Group Meetings

El Cajon -	13	San Marcos -	76
Encinitas -	17	Santee -	13
Escondido -	5	Solana Beach -	109
Imperial Beach -	0	Vista -	29
La Mesa -	9	Unincorporated -	41
Lemon Grove -	4	Other -	1

75% were unaware a regional HazMit plan exists

61% had been impacted by a disaster

86% said they were concerned about being impacted.

Biggest hazards:

Wildfire/Structure Fire – 41%

Earthquake - 31%

Drought – 8%

Climate Change – 4%

Coastal Storm/Erosion – 3%

Next biggest hazards:

Earthquake – 33%

Wildfire/Structure Fire – 17%

Drought – 16%

Terrorism – 3%

Climate Change – 3%

6.87 % live or have a business in a flood plain

9.23 % have flood insurance, 10.17 % aren't sure if they do or not

If they don't have flood insurance it is because

Not in flood plain – 58%

Home/business elevated or protected – 19%

Never floods – 4%

Too expensive – 5%

3 Most common steps local government can take

Increase awareness

Conduct more exercises/drills

Add resources (more fire assets, helicopters, CERT, etc.)

Other concerns

Getting emergency information

Government needs to be eco-friendly

Rated six categories on level of importance:

Category	Importance		
	Very	Somewhat	Not
Prevention	76%	21%	2%
Property Protection	55%	39%	6%
Public Awareness	77%	21%	2%

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Working Group Meetings

Nat. Resources	65%	29%	6%
Emerg. Services	88%	11%	1%
Structural Projects	54%	38%	8%

Review of Hazards

Tom Amabile reviewed the hazards in the revised plan:

Coastal Storm/Erosion/Tsunami/Sea Level Rise

8 local proclamations of emergencies

Coastline heavily developed/populated

Prone to erosion

Sea level rise predicted to be between 3 and 12 inches by 2030.

Dam Failure

Over 30 significant dams in the County

Most over 35 years old

Increased downstream development

Drought

Not originally in plan (reliance on imported water reduces our risk from local drought)

State-wide drought puts us at risk

Floods

Large portions of the County within 100 year flood plain

2 proclaimed emergencies in last 15 years

Moderate rainfall results in urban/flash floods on routine basis

Hazardous Materials

Over 100 licensed sites within the region

Regional HazMat team responds to hundreds of calls each year.

Landslide

Landslide prone areas found throughout the county

Most recent damaging landslide was 2007 in La Jolla. 111 homes evacuated, 40 found to be uninhabitable due to ground instability and 7 suffered significant damage.

Terrorism

Every major metropolitan area is susceptible to a terrorist event

Wildfire/Structure Fire

Occur frequently – significant wildfires breakout routinely

5 proclaimed emergencies due to wildfire between 2003 and 2014

Drought increases the risk due to low fuel moisture.

Hazards Not in the Plan

Avalanche

Hailstorm

Nuclear Materials Release (removed due to SONGS decommissioning)

Severe Winter Storms

Volcano

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Windstorm

Existing Objectives:

Reduce vulnerability to:

Geologic hazards (earthquake, landslides, liquefaction, etc.)

Wildfires/structure fires

Flooding/dam failure

Coastal erosion/coastal bluff failure/storm surge/tsunami/sea level rise

Severe Weather (including extreme heat)

Increase public support for hazard mitigation

Improve hazard mitigation coordination between all levels of government

Promote disaster resistant existing and future development

Build and support local capacity

Need to develop a goal for drought

Homework

Review current goals and objectives for your jurisdiction

Delete completed items

Add new items

Identify 5 to 10 priority action items

Start Date

Agency/department responsible

Cost/Funding source

Estimated completion date

Short description of the project

Please provide to Tom by 10/15/14

Next Meeting date to be determined.

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 1



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**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 1



February 11, 2014

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**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings



**Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 2**

3/11/2014

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**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 2

3/11/2014



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**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 3

6/24/2014



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Sitta, Rick	El Cajon		rsitta@heartlandfire.net	
Smith, Tim	Lemon Grove		tsmith@heartlandfire.net	
Trottier, Michelle	Santee		mtrottier@cityofsantee.gov	
Valencia, John	San Diego		jvalencia@sandiego.gov	
Vanvoorhees, Greg	Oceanside		gvvanvoorhees@ci.oceanside.ca.us	

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 3

6/24/2014



NAME	JURISDICTION/ AGENCY	TELEPHONE	EMAIL	INITIAL
Croucher, Gary	San Miguel FPD		gcroucher@smgfire.org	
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Parr, Andy	Lakeside FPD		aparr@lakesidefire.org	AP
Paskie, Bill	Alpine FPD		bpaskie@alpinefire.org	BP
Villarreal, Leonard	San Miguel FPD		lvillarreal@smgfire.org	
Batchelor, Jason	PDS		jason.batchelor@sdcountry.ca.gov	
Higbee, Melissa	ICLEI		melissa.higbee@iclei.org	
Lorek, Kirstin	SDSO		klorek@sdsso.org	
Rand, Michael	SDSO		mrands@sdsso.org	MR
Saltowitz, Shelly	HHSA		shelly.saltowitz@sdcountry.ca.gov	
Shinde, Gitanjali	DPW		gitanjali.shinde@sdcountry.ca.gov	SS
Turner, Matt	County Fire Authority		matthew.turner@sdcountry.ca.gov	
Byrd, Michael	Padre Dam MWD		mbyrd@padre.org	MB
Dambach, Dan	Vista Irrigation District		ddambach@vid-h2o.org	
Olson, Gabriela	Valley Center MWD		golson@vcwmwd.org	
Mosburg, Sue	Sweetwater Authority		smosburg@sweetwater.org	
Prus, Lisa	SDCWA		lorus@sdcwa.org	
Sorce, Lisa	Padre Dam MWD		lsorce@padre.org	
Williams, Dennis	Valley Center MWD		dwilliams@vcwmwd.org	
McBroom, Jason	Alpine Fire		jmcBroom@alpinefire.org	JB

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 4

11/18/2014



NAME	JURISDICTION/ AGENCY	TELEPHONE	EMAIL	INITIAL
Amabile, Tom	San Diego OES		tom.amabile@sdcounty.ca.gov	TA
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Balmer, Marisa	Chula Vista		mbalmer@chulavista.gov	
Cawthon, Dane	Poway		dcawthon@poway.org	
Easterling, Mike	Vista		measterline@ci.vista.ca.us	ME
Freels, Mona	Heartland Fire - El Cajon, La Mesa, Lemon Grove		mfreels@heartlandfire.net	MF
Gallup, Tom	Encinitas, Del Mar, Solana Beach		tgallup@encinitas.ca.gov	
Gipson, Justin	Chula Vista		jgipson@chulavista.gov	JP
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Hansen, Scott	San Marcos		shansen@san-marcos.net	
Harrison, David	Carlsbad		david.harrison@carlsbadca.gov	DH
Jimenez, Corina	Encinitas		cjimenez@encinitas.ca.gov	CJ
Mattick, Richard	Santee		rmattick@ci.santee.ca.us	
Pack, Jeff	San Diego		jpack@sandiego.gov	
Peake, Perry	Coronado		ppeake@coronado.ca.us	
Racela, Dave	San Diego		dracela@sandiego.gov	
Rawson, Don	Escondido		drawson@escondido.org	
Richards, Dave	Poway		drichards@poway.org	
Roberts, Dave	Imperial Beach		droberts@imperialbeachca.gov	
Ruzzini, Eugene	San Diego		eruzzini@sandiego.gov	ER
Smith, Tim	Lemon Grove		tsmith@heartlandfire.net	
Trottier, Michelle	Santee		mtrottier@cityofsantee.gov	
Valencia, John	San Diego		jvalencia@sandiego.gov	
Vanvoorhees, Greg	Oceanside		gvanvoorhees@ci.oceanside.ca.us	GV

**Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)**

APPENDIX A

Working Group Meetings

Multi-jurisdiction Hazard Mitigation Plan Update
2014
Working Group Meeting # 4

6/24/2014



NAME	JURISDICTION/ AGENCY	TELEPHONE	EMAIL	INITIAL
Croucher, Gary	San Miguel FPD		gcroucher@smgfire.org	
Gibbs, Michael	Rancho Santa FE FPD		Gibbs@RSF-Fire.org	
Parr, Andy	Lakeside FPD		aparr@lakesidefire.org	
McBroom, Jason	Alpine FPD		jmcbroom@alpinefire.org	
Villarreal, Leonard	San Miguel FPD		lvillarreal@smgfire.org	LV
Batchelor, Jason	PDS		jason.batchelor@sdcounty.ca.gov	
Higbee, Melissa	ICLEI		melissa.higbee@iclei.org	
Lorek, Kirstin	SDSO		klorek@sdsso.org	
Rand, Michael	SDSO		mrands@sdsso.org	MR
Saltowitz, Shelly	HHSA		shelly.saltowitz@sdcounty.ca.gov	
Shinde, Gitanjali	DPW		gitanjali.shinde@sdcounty.ca.gov	SG
Turner, Matt	County Fire Authority		matthew.turner@sdcounty.ca.gov	
Byrd, Michael	Padre Dam MWD		mbyrd@padre.org	MB
Dambach, Dan	Vista Irrigation District		ddambach@vid-h2o.org	
Levin, Diana	Padre Dam MWD		dlevin@padre.org	
Mosburg, Sue	Sweetwater Authority		smosburg@sweetwater.org	
Olson, Gabriela	Valley Center MWD		golson@vcwmwd.org	
Prus, Lisa	SDCWA		lprus@sdowa.org	
Sorce, Lisa	Padre Dam MWD		lsorce@padre.org	
Williams, Dennis	Valley Center MWD		dwilliams@vcwmwd.org	

Appendix E - Water Shortage Contingency Plan
(Sub-Appendix E - Multi-Jurisdictional Hazard Mitigation Plan)

APPENDIX B

Data Matrix

APPENDIX B: DATA MATRIX

NAME	SOURCES	QUERY (IF ANY)	NOTES (INCL. CREDITS)
Coastal Storm/Erosion	HYD_FLOODPL	FLD_ZONE = 'VE'	Federal Emergency Management Agency (FEMA)
Tsunami	HYD_TSUNAMI_INUNDATION_AREA		California Emergency Management Agency (CalEMA), University of Southern California (USC) and California Geological Survey (CGS)
Dam Failure	HYD_DAM_INUNDATION		California Office of Emergency Services and County of San Diego
100-Year Earthquake	HAZUS, USGS		Federal Emergency Management Agency (FEMA; HAZUS); soil from U.S. Geological Survey VS30 data - http://earthquake.usgs.gov/hazards/apps/vs30/custom.php
500-Year Earthquake	HAZUS, USGS		Federal Emergency Management Agency (FEMA; HAZUS); soil from U.S. Geological Survey VS30 data - http://earthquake.usgs.gov/hazards/apps/vs30/custom.php
Rose Canyon M6.9 Scenario	USGS		U.S. Geological Survey
100-Year Flood	HYD_FLOODPL	FLOOD_PLAI = 'FP100' OR FLOOD_PLAI = 'FW100'	Federal Emergency Management Agency (FEMA)
500-Year Flood	HYD_FLOODPL	FLOOD_PLAI = 'FP500'	Federal Emergency Management Agency (FEMA)
Rain-Induced Landslide (High Risk)	GEO_LANDSLIDE_CN	soil_slip_risk = 'High' OR state Landslide_cat = 'Most Susceptible' OR GABRO_SLOPE = 'YES'	State of California, U.S. Geological Survey, Federal Emergency Management Agency (FEMA; HAZUS) and County of San Diego
Rain-Induced Landslide (Moderate Risk)	GEO_LANDSLIDE_CN	(soil_slip_risk = 'Moderate' OR state Landslide_cat = 'Marginally Susceptible') AND GABRO_SLOPE = ''	State of California, U.S. Geological Survey, Federal Emergency Management Agency (FEMA; HAZUS) and County of San Diego
Fire Regime Group I	LANDFIRE	<= 35 Year Fire Return Interval, Replacement Severity	U.S. Department of Agriculture Forest Service and U.S. Department of the Interior
Fire Regime Group IV	LANDFIRE	35 - 200 Year Fire Return Interval, Replacement Severity	U.S. Department of Agriculture Forest Service and U.S. Department of the Interior
Extreme Heat	Cal-Adapt	Maximum temperature - MONTHLY - August 2020 - A2 GFDL	California Energy Commission (CEC) - http://cal-adapt.org/
Sea Level Rise (Coastal Flooding)	Areas inundated by unimpeded Pacific coastal flooding under a scenario of 1.4-meter (55-inch) sea-level rise		Pacific Institute -- http://www2.pacinst.org/
Sea Level Rise (MHHW)	Area inundated by mean higher high water (MHHW) under 1.4-meter (55-inch) sea-level rise scenario		Pacific Institute -- http://www2.pacinst.org/

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APPENDIX C

Implementation Status

APPENDIX C: IMPLEMENTATION STATUS

County of San Diego

Priority	Action Item Number	Description	Status
1.	3.B.1	Update Operational Area Plan.	Completed.
2.	2.D.4	Continue to develop and maintain public education and outreach programs.	Completed. On-going.
3.	10.A.1	Update the County Consolidated Fire Code every three years.	On-going.
4.	4.B.3	Continue to streamline policies to eliminate conflicts and duplication of efforts.	On-going.
5.	2.A1	Publicize and encourage the adoption of appropriate hazard mitigation actions.	Completed. On-going.
6.	6.A.1	Update Building Codes to reflect current earthquake standards.	Completed. On-going
7.	2.E.1	Support public and private sector symposiums.	On-going.
8.	4.A.4	Maintain multi-jurisdictional/multi-functional training and exercises to enhance hazard mitigation.	Completed. On-going
9.	4.A.3	Continue to review and update plans that would include coordination with cities, special districts and County departments.	Completed, on-going.
10.	Attach A 1.E.1	Continue to encourage the public to prepare and maintain a 3-day preparedness kit for home and work.	Completed, on-going.

APPENDIX D

Survey Results

APPENDIX D: SURVEY RESULTS FOR SD MULTIJURISDICTIONAL HAZARD MITIGATION PLAN REVISION

There were 532 respondents for this survey. Of those people:

- 271 chose to provide their name
- 267 provided their e-mail
- 222 provided their phone number

All of the 532 Respondents provided the cities or communities in which they live and work. Although there were respondents from all areas of the county:

- The majority of people stated they live and/or work in the northern part of the county (Example: Solana Beach, Del Mar, Carlsbad, Encinitas, etc.)
- Western and Central San Diego (Example: City of San Diego, Point Loma, etc.) had many respondents, but much less than North County
- There was only a handful of Respondents who claimed to be from the South Bay and Eastern area of the county (Example: Chula Vista, Bonita, Lakeside, Lemon Grove, etc.).

Almost everyone stated they were responding to this survey as a Resident. (524 Answered; 8 Skipped)

- 96.56% (506 Responders) responded as a Resident.
- 2.67% (14 Responders) responded as a Community Organization.
- 0.57% (3 Responders) responded as a Local Business.
- 0.19% (1 Responders) responded as a Non-profit Organization.

According to the responses to question 4, “Are you aware of the San Diego Multijurisdictional Hazard Mitigation Plan developed in 2004 and revised in 2010?” (529 Answered; 3 Skipped)

- 25.52% YES
- 74.48% NO.

When asked, “Have you ever experienced or been impacted by a disaster?” (529 Answered; 3 Skipped)

- 4.54% answered YES
- 38.94% answered NO.
- 56.52% answered YES and explained what the disaster was. Of those people who provided details, earthquakes and having to evacuate their homes due to wild fires was the most common answer.

Question 6 asked, “How concerned are you about the possibility of your community being impacted by a disaster?” (527 Answered; 5 Skipped)

- 18.41% are Extremely Concerned
- 31.31% are Very Concerned

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APPENDIX D

Survey Results

- 35.86% are Moderately concerned
- 13.09% are only Slightly concerned
- 1.33% are Not at all concerned

Question 7 asked people to select the one hazard they think is the highest threat to their neighborhood. (523

Answered; 9 Skipped):

- 41.49% - Structure/Wild Land Fires
- 31.17% - Earthquake
- 8.03% - Drought
- 5.54% - Other (Examples: too much government regulation, Tornadoes, Power outage)
- 3.63% - Climate change
- 2.87% - Coastal Storms/Erosion
- 1.34% - Tsunami
- 1.15% - Extreme heat
- 0.96% - Pandemic
- 0.96% - Landslide
- 0.76% - Severe Winter Storm
- 0.76% - Terrorism
- 0.38% - Extreme Wind
- 0.19% - Nuclear accident
- 0.19% - Hazardous Materials Incident
- 0.19% - Dam Failure
- 0.19% - Flood
- 0.19 % - Oil or Gas line failure
- 0.00% - Liquefaction.

Question 8 had people choose the hazard they think is the second highest threat to their neighborhood. (513

Answered; 19 Skipped):

- 32.55% - Earthquake
- 16.96% - Structure/Wild Land Fire
- 16.37% - Drought
- 3.70% - Other
- 3.31% - Terrorism
- 3.31% - Climate Change
- 3.12% - Coastal Storms/Erosion
- 2.73% - Extreme Heat
- 2.73% - Severe Winter Storm
- 2.53% - Landslide
- 2.53% - Pandemic
- 2.14% - Extreme Wind

APPENDIX D

Survey Results

- 1.95% - Oil or Gasoline Failure
- 1.95 – Tsunami
- 1.56% - Flood
- 0.78% - Hazardous Materials Incident
- 0.78% - Dam Failure
- 0.58% - Nuclear Accident
- 0.39% - Liquefaction

In reference to the question, “Is your home or business located in a flood plain?” (524 Answered; 8 Skipped)

- 6.87% of people have a home or business that is located in a floodplain
- 93.13% said they do not have a home or business in a flood plain

The following question asked, “Do you have flood insurance?” (531 Answered; 1 Skipped)

- 9.23% of people said they do have flood insurance
- 60.80% said they do not have flood insurance
- 10.17% of people said they do not know if they have flood insurance

When asked people why they do not have flood insurance (469 Answered; 63 Skipped)

- 58.21% said they do not have flood insurance because their home or business is not located in a flood plain
- 18.76% of people do not have flood insurance because their home/business is elevated or otherwise protected
- 4.26% claim it is not necessary because it never floods
- 4.90% said flood insurance is too expensive
- 3.10% said they have never really considered getting flood insurance
- 5.76% have “other reasons”. The majority of people who chose other as their answer explained they do not have flood insurance because they rent or because flood insurance is too expensive.

When asked, “Have you taken any actions to make your home, business or neighborhood more resistant to hazards?”(526 Answered; 6 Skipped)

- 60.27% of people who answered said they have taken actions to make their home, business, or neighborhood more resistant to hazards
- 39.73% have not taken any action

The following question asked if they are interested in making their home, business or neighborhood more resistant to hazards (523 Answered; 9 Skipped)

- 85.09% of people are interested in making their home, business, or neighborhood more resistant to hazards
- 14.91% are not interested

APPENDIX D

Survey Results

When people were asked what the most effective way to receive information about how to make their home, business, or neighborhood more resistant to hazards (520 Answered; 12 Skipped):

- 52.12% said email
- 13.08% answered internet
- 8.85% answered Mail
- 7.88% said Television
- 7.88% Public workshops
- 4.81% selected Social Media
- 3.65% said Newspaper
- 1.73% said Radio

The follow up question was, “Do you require assistance in receiving information?” (528 Answered; 4 Skipped)

- 97.92% Do not require assistance in receiving information
- 2.08% Require assistance

Question 16 asks people to give their opinion in reference to what are some steps the local government could take to reduce or eliminate the risk of future hazard damages in their neighborhood. (405 Answered; 127 Skipped)

- The 3 most common answers people gave were: Increase public emergency awareness/education, conduct more mock disaster drills, and increase emergency resources and equipment (more fire depts., helicopters, C.E.R.T., etc.).
- Other steps which were suggested were: improve AlertSanDiego.org, monitor people’s water usage and inspect homes for safe property practices, and for the cities and county to better maintain land/forestry.

When asked if there are any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that are important, many people continue to comment about how they are not well informed on how to react in the event of an emergency or disaster (234 Answered; 298 Skipped):

- People feel there is not an effective means to disseminate emergency information.
- Another common topic in people’s response to this question is their concern as to what the cities/county is doing to be eco-friendly.

The final question asks people, in their opinion, to rate the level of importance of the six broad categories of community-wide activities. (529 Answered; 3 Skipped)

1. Prevention – Administrative or regulatory actions that influence the way land is developed and buildings are constructed. (Example – Planning and zoning building codes, etc.)
 - a. Very Important: 76.15%
 - b. Somewhat Important: 21.56%
 - c. Not Important: 2.29%

APPENDIX D

Survey Results

2. Property Protection – Actions that involve the modification of existing buildings or structures to protect them from a hazard area (Example – Retrofits, relocation, acquisition, etc.)
 - a. Very Important: 55.05%
 - b. Somewhat Important: 39.43%
 - c. Not Important: 5.52%
3. Public Education and Awareness – Actions to inform and educate residents, elected officials and property owners about the hazards and potential ways to mitigate them (Example – Outreach, real estate disclosure, school-age and adult education.
 - a. Very Important: 76.57%
 - b. Somewhat Important: 21.71%
 - c. Not Important: 1.71%
4. Natural Resources Protection – Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems (Examples – Erosion control, stream restoration, etc.)
 - a. Very Important: 64.63%
 - b. Somewhat Important: 29.25%
 - c. Not Important: 6.12%
5. Emergency Services – Actions that protect people and property during and immediately after a disaster or hazard event (Example – Warning systems, protection of official facilities, etc.)
 - a. Very Important: 88.80%
 - b. Somewhat Important: 10.63%
 - c. Not Important: 0.57%
6. Structural Projects – Actions that involve the construction of structures to reduce the impact of a hazard (Example – Dams, floodwalls, seawalls, etc.)
 - a. Very Important: 53.82%
 - b. Somewhat Important: 37.98%
 - c. Not Important: 8.21%

Appendix F: Member Agency Local Supply Projections

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Table F-1 (DRAFT)
Member Agency Surface Water Projections

Member Agency	Reservoir	Annual Member Agency Planned Local Use (AF)						Basis for Yield (information provided by member agencies)
		2020	2025	2030	2035	2040	2045	
Escondido, City of	Henshaw / Wohlford	5,000	5,000	5,000	5,000	5,000	5,000	25-year average.
Helix WD	Cuyamaca / El Capitan	1,542	1,542	1,542	1,542	1,542	1,542	Based on historical 25 year median runoff of 3,346 AFY, reduced by historical 25 year median evaporation rate loss of 1,804 AFY.
San Diego, City of	Barrett El Capitan Hodges Lower Otay Morena San Vicente Sutherland	22,015	22,015	22,015	22,015	22,015	22,015	Excludes Cal-Am
	Cuyamaca	400	400	400	400	400	400	Inter-Agency Agreement: City-Lake Cuyamaca
San Dieguito WD	San Dieguito / Hodges	1,877	2,135	2,135	2,434	2,434	2,434	Fractional interest of : 42.67% / 57.33% (SDWD / SFID) (Due to DSOD restrictions, total of 4,400 AF for 2020; 5,000 AF for 2025 and 2030; and 5,700 AF as of 2035.
Santa Fe ID	San Dieguito / Hodges	3,403	2,865	2,865	3,268	3,268	3,268	
Sweetwater Authority	Loveland / Sweetwater	5,000	5,000	5,000	5,000	5,000	5,000	Based on production average over the last 10 years.
Vista I.D.	Henshaw	5,000	5,000	5,000	5,000	5,000	5,000	Based on 60 year average and requirements under SLR Indian Water Rights Settlement Agreement.
Total:		44,237	43,957	43,957	44,659	44,659	44,659	

Appendix F - Member Agency Local Supply Projections

Table F-2 (DRAFT)
Member Agency Groundwater Projections

EXISTING GROUNDWATER [YIELD] PROJECTS AND PROPOSED EXPANSIONS (VERIFIABLE)

Member Agency	Project or Facility Name	Project Type	Groundwater Basin or Location	Existing (AF/YR) ¹	Projected Yield Verifiable Projects (AF/YR)					
				Based on Period 2015-2019	2020	2025	2030	2035	2040	2045
Helix WD	Groundwater Production Well 101	Pump & Blend (with raw imported water)	El Monte Basin		100	100	100	100	100	100
Lakeside WD	Vine Street Groundwater Production Facility	Pump & Treat (blend with imported water)	Santee Basin (San Diego River Basin)		700	700	900	900	900	900
Oceanside, City of	Mission Basin Desalter Facility - 1st & 2nd Phase of Desal Expansion & IPR	Brackish Groundwater Recovery & Treatment	Mission Basin (Lower San Luis Rey River Valley)		2,800	2,800	2,800	2,800	2,800	2,800
MCB Camp Pendleton	Groundwater Production Wells	Pump & Conventional Treatment	Lower Santa Margarita, Las Flores, San Mateo, and San Onofre Basins		7,330	8,500	9,500	9,500	9,500	9,500
MCB Camp Pendleton/ Fallbrook PUD (Conjunctive-Use Project)	Santa Margarita Conjunctive-Use Project	Pump & Conventional Treatment	Lower Santa Margarita River Basin (Upper Ysidora and Chappo Sub-basins).	Fallbrook Treatment Plant (to be completed in 2021)	-	3,100	3,100	3,100	3,100	3,100
San Diego, City of	San Vicente GW Production Well	Pump & Blend	Santee/El Monte	0	0	50	50	50	50	50
	El Capitan GW Production Well	Pump & Blend	Santee/El Monte	20	20	50	50	50	50	50
Sweetwater Authority	Richard A. Reynolds Desalination Facility	Brackish Groundwater Recovery	San Diego Formation		5,600	5,600	5,600	5,600	5,600	5,600
	National City Well Field	Pump & Disinfection	San Diego Formation [National City Well Field]		1,900	1,900	1,900	1,900	1,900	1,900
Yuima MWD	Yuima MWD & Local Mutual Water Companies	Groundwater Extraction	Pauma Basin (Upper San Luis Rey River Valley)	5,673	7,500	7,500	7,500	7,500	4,000	4,000
Total Verifiable					25,950	30,300	31,500	31,500	28,000	28,000

¹ 5-year average 2015-2019

ADDITIONAL PLANNED PROJECTS

Member Agency	Project or Study Name	Project Type	Groundwater Basin or Location	Study / Project Status	Groundwater Additional Planned (AF/YR)					
					2020	2025	2030	2035	2040	2045
Olivenhain MWD	San Dieguito River Basin Brackish GW Recovery and Treatment	Brackish Groundwater Recovery	San Dieguito River Groundwater Basin	Pilot Production Well Study Ongoing (2020)	-	1,120	1,120	1,120	1,120	1,120
Otay WD	Rancho del Rey Groundwater Well Development (Capacity)	Groundwater Recovery	Unknown	Feasibility Study & CEQA complete	-	-	-	500	500	500
Additional Planned Yields					-	1,120	1,120	1,620	1,620	1,620

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Appendix F - Member Agency Local Supply Projections

Table F-2 (DRAFT)
Member Agency Groundwater Projections (continued)

PROJECT CONCEPTS AND ONGOING FEASIBILITY STUDIES

Member Agency	Project or Study Name	Project Type	Groundwater Basin or Location	Study / Project Status	Groundwater Conceptual (AF/YR)					
					2020	2025	2030	2035	2040	2045
Otay WD	Otay Mesa Lot 7 Groundwater Well System (Capacity)	Groundwater Recovery	Unknown	Feasibility Study	-	-	-	400	400	400
Otay WD	Middle Sweetwater River Basin Groundwater Well System (Capacity)	Groundwater Recovery	Middle Sweetwater River Basin	Advanced Planning Stage	-	-	-	1,000	1,000	1,000
Vallecitos WD	San Marcos Groundwater Basin Supply Options	Groundwater Recovery/ Water Recharge	San Marcos	Project Concept/ Feasibility Study	-	-	2,000	2,000	2,000	2,000
Project Concepts Yields					-	-	2,000	3,400	3,400	3,400

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Appendix F - Member Agency Local Supply Projections

Table F-3 (DRAFT)
Member Agency Wastewater Treatment
San Diego Wastewater Treatment and Water Recycling Facilities Plant Capacity
(Million Gallons/Day)

Operating Agency	Treatment Facility Name	Planned Treatment Capacity						Effluent Quality for TDS (mg/L)	Disposal Method
		2025			2050				
		P	S	T	P	S	T		
Carlsbad, City of	Carlsbad WRF	-	-	7.0	-	-	7.0	1,000	Irrigation/Industrial
Encina Wastewater Authority	Encina WPCF	43.3	43.3	-	43.3	43.3	-	1,031	Outfall-Reuse
Escondido, City of	Hale Avenue Resource Recovery Facility (HARRF)	18.0	18.0	9.0	27.0	27.0	20.0	1,000	Reuse-Outfall
Fairbanks Ranch Comm. Ser. D	Fairbanks Ranch WPCF	0.3	0.3	-	0.3	0.3	0.3	1,100	Percolation
Fallbrook PUD	Fallbrook Plant #1 WRF	2.7	2.7	2.7	2.7	2.7	2.7	850	Reuse-Outfall
Leucadia CWD	Forest R. Gafner WRP	1.0	1.0	1.0	1.0	1.0	1.0	1,000	Reuse-Outfall
Oceanside, City of	La Salina WWTP	5.5	5.5	-	-	-	-	897	Outfall
Oceanside, City of	San Luis Rey WWTP	13.5	13.5	3.0	17.4	17.4	9.0	874	Reuse-Outfall
Olivenhain MWD	4-S Ranch WWTP	2.0	2.0	2.0	2.0	2.0	2.0	1,000	Reuse
Otay WD	Ralph W Chapman WRF	1.3	1.3	1.3	1.3	1.3	1.3	850	Reuse- Outfall
East County Advanced Water Purification Joint Powers Authority (reported by Padre Dam MWD)	East County Advanced Water Purification JPA (will replace the existing Ray Stoyer WRF)	16.0	16.0	16.0	16.0	16.0	16.0	800 mg/L recycled water, 100 mg/L purified water	Irrigation, Santee Lakes, Indirect Potable Reuse
East County Advanced Water Purification Joint Powers Authority (reported by Padre Dam MWD)	East County Advanced Water Purification JPA potential expansion (conceptual)	-	-	-	2.0	2.0	2.0	100	Indirect Potable Reuse
Camp Pendleton Marine Corps Base	Southern Region TTP	-	-	7.5	-	-	7.5	750	Irrigation/Injections/Outfall
Camp Pendleton Marine Corps Base	Northern Region TTP	-	-	4.0	-	-	4.0	750	Irrigation/Percolation
Rainbow MWD	San Luis Rey WWTP	-	1.0	-	-	1.0	-		Reuse-Outfall
Ramona MWD	Santa Maria WRP	-	0.4	0.2	-	0.5	0.4	850	Reuse-Irrigation
Ramona MWD	San Vicente WRP	-	-	0.5	-	-	0.6	550	Reuse-Irrigation
Rancho Santa Fe Com. Service District	Santa Fe Valley WRF	-	-	0.5	-	-	0.5	1,000	Irrigation
Rancho Santa Fe Com. Service District	Rancho Santa Fe WRF	0.5	0.5	-	0.6	0.6	0.6	1,100	Percolation
Rincon del Diablo MWD	Harmony Grove Village	-	-	0.2	-	-	0.3	1,000	Reuse - Irrigation
Rincon del Diablo MWD	Harmony Grove Village - South	-	-	0.2	-	-	0.3	1,000	Reuse - Irrigation
San Diego, City of	North City WRP	52.0	52.0	52.0	52.0	52.0	52.0	1,000	Reuse
San Diego, City of	Point Loma WWTP	240.0	-	-	240.0	-	-	1700-3000	Outfall
San Diego, City of	Harbor Drive WRP	-	-	-	72	72	72	1,000	Reuse
San Diego, City of	South Bay WRP	15	15	15	15	15	15	1,000	Reuse-Outfall
San Elijo Joint Powers Authority	San Elijo WRF	5.3	5.3	3.0	5.3	5.3	5.3	950	Reuse-Outfall
Vallecitos WD	Meadowlark WRF	5.0	5.0	5.0	5.0	5.0	5.0	1,000	Reuse
Valley Center MWD	Lower Moosa Canyon WRF	0.40	0.40	0.40	0.875	0.875	0.875	1,000	Irrigation
Valley Center MWD	Welk WRF	-	-	-	0.125	0.125	0.125	1,000	Irrigation (Golf Course)
Valley Center MWD	Lilac Hills Ranch WRF	-	-	-	0.350	0.350	0.350	1,000	Irrigation
Valley Center MWD	Woods Valley Ranch WRF	0.275	0.275	0.275	0.475	0.475	0.475	1,000	Irrigation (Golf Course)
Valley Center MWD	North Village WRF (WVR Ph. 4)	-	-	-	0.125	0.125	0.125	1,000	Irrigation
Valley Center MWD	Meadowood WRF	0.170	0.170	0.170	0.170	0.170	0.170	1,000	Irrigation
Whispering Palms CSD	Whispering Palms WPCF	0.5	0.5	-	0.5	0.5	0.5	963	Pasture-Percolation
		422.73	184.13	130.93	505.50	267.00	227.38		

CSD - Community Services District
MWD - Municipal Water District
RRF - Resource Recovery Facility
TTP - Tertiary Treatment Plant
WPCF - Water Pollution Control Facility
WRP - Water Reclamation/Recycling Facility
WWTP - Wastewater Treatment Plant

P - Primary Treatment
S - Secondary Treatment
T - Tertiary Treatment

DRAFT 02/25/2021

Appendix F - Member Agency Local Supply Projections

Table F-4 (DRAFT)
Member Agency Recycled Water Projections

EXISTING RECYCLED PROJECTS AND PROPOSED EXPANSIONS (VERIFIABLE)

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse ¹	Projected Verifiable Reuse (AF/YR) ²					
				2020	2025	2030	2035	2040	2045
Carlsbad MWD	Carlsbad WRF/Carlsbad MWD	Tertiary	Landscape, Agriculture, Industrial	2,450	2,450	2,450	2,450	2,450	2,450
	Gafner WRF/Leucadia CWD	Tertiary	Landscape, Agriculture	275	275	275	275	275	275
	Meadowlark WRF (via Mahr Reservoir) /Vallecitos WD	Tertiary	Landscape, Agriculture	2,565	2,565	2,565	2,565	2,565	2565
	Sub-total			5,290	5,290	5,290	5,290	5,290	5,290
Del Mar, City of	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	100	125	150	150	150	150
Escondido, City of	Hale Avenue RRF/WRF/City of Escondido	Tertiary	Landscape, Agriculture, Industrial/PR	3,000	3,650	4,400	4,400	4,400	4,400
Fallbrook PUD	Fallbrook Plant #1/Fallbrook PUD	Tertiary	Landscape, Agriculture	560	830	830	830	830	830
Oceanside, City of	San Luis Rey WWTP/City of Oceanside - Phase 1 Expansion	Tertiary	Landscape	3,000	3,000	5,040	5,040	5,040	5,040
Olivenhain MWD	4S Ranch WRF/Olivenhain MWD	Tertiary	Landscape	1,050	1,050	1,050	1,050	1,050	1,050
	Connection #1-North City Water Reclamation Plant/City of San Diego	Tertiary	Golf Course Irrigation/HOAs (includes farms at 272 AF/YR)	427	427	427	427	427	427
	Connection #2-North City Water Reclamation Plant/City of San Diego	Tertiary	Golf Course Irrigation/HOAs	23	23	23	23	23	23
	Santa Fe Valley WRF/Rancho Santa Fe CSD	Tertiary	Landscape, Golf Course Irrigation	140	140	140	140	140	140
	Northwest Quadrant /Meadowlark WRF/Vallecitos WD	Tertiary	Landscape	728	728	728	728	728	728
	SEJPA1-Quail Gardens	Tertiary	Landscape	123	123	123	123	123	123
	SEJPA2-Village Park	Tertiary	Landscape	84	160	236	236	236	236
	Sub-total			2,575	2,651	2,727	2,727	2,727	2,727
Otay WD	R. W. Chapman WRF/Otay WD	Tertiary	Landscape	1,100	1,100	1,100	1,100	1,100	1,100
	South Bay WRP/City of SD	Tertiary	Landscape	3,000	3,400	3,900	4,000	4,100	4,200
	Sub-total			4,100	4,500	5,000	5,100	5,200	5,300
Padre Dam MWD	Ray Stoyer WRF (Existing)	Tertiary	Replenishment of Santee Lakes ⁴	-	-	-	-	-	-
	Ray Stoyer WRF (Existing)/Padre Dam MWD (source water from ECAWP WRF starting in 2025) ³	Tertiary	Landscape, Irrigation, Dust Control	780	1,232	1,232	1,232	1,232	1,232
	Sub-total			780	1,232	1,232	1,232	1,232	1,232
Camp Pendleton Marine Corps Base	South WWTPs/USMC	Tertiary	Landscape, Golf Course, Agriculture	980	980	980	980	980	980
	South WWTPs/USMC	Tertiary	Injection - Las Flores Basin	450	450	450	450	450	450
	South WWTPs/USMC	Tertiary	Injection - Santa Margarita Basin	-	870	870	870	870	870
	North WWTPs/USMC	Tertiary	Landscape/Seawater Intrusion Barrier	800	870	970	970	970	970
Sub-total			2,230	3,170	3,270	3,270	3,270	3,270	
Poway, City of	North City WRP/City of San Diego	Tertiary	Landscape, Agriculture	450	450	450	450	450	450
Ramona MWD	Santa Maria WRP/Ramona MWD	Tertiary	Landscape, Recreational Impound, Development	200	300	300	300	300	300
	San Vicente WRP/Ramona MWD	Tertiary	Landscape (golf course) Agriculture (orchard)	500	500	500	500	500	500
	Sub-total			700	800	800	800	800	800
Rincon Del Diablo MWD	Hale Avenue RRF/City of Escondido HGWRP/Rincon MWD	Tertiary	Landscape, Industrial	1,850	2,000	2,000	2,000	2,000	2,000
San Diego, City of	North City & South Bay WRPs/ City of San Diego	Tertiary	Landscape, Industrial	11,300	13,773	13,773	13,773	13,773	13,773
San Dieguito WD	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	700	700	700	700	700	700
Santa Fe ID	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	600	600	600	600	600	600
Valley Center MWD	Woods Valley Ranch WRF/VCMMWD	Tertiary	Landscape Irrigation/Golf Course Irrigation	47	47	47	47	47	47
	Woods Valley Ranch WRF (Phase 2)	Tertiary	Landscape Irrigation/Golf Course Irrigation	90	175	184	184	184	184
	Sub-total			137	222	231	231	231	231
Total				37,372	42,993	46,493	46,593	46,693	46,799

Appendix F - Member Agency Local Supply Projections

Table F-4 (DRAFT)
Member Agency Recycled Water Projections (continued)

ADDITIONAL PLANNED PROJECTS

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse ¹							Project Phase
				2020	2025	2030	2035	2040	2045	
Carlsbad MWD	Carlsbad WRF/Carlsbad MWD	Tertiary	Landscape, Agriculture	-	425	425	425	495	495	Design/Planning
Escondido, City of	Hale Avenue Resource Recovery Facility (HARRF)	Tertiary	Landscape, Agriculture, Industrial, PR	-	3,400	3,400	6,800	6,800	6,800	FS
Olivenhain MWD	SEJPA 3 (Manchester Avenue Phases I and II)	Tertiary	Landscape	-	40	40	40	40	40	Construction Late 2020
Camp Pendleton Marine Corps Base	South WWTPs/USMC	Tertiary	Indirect Potable Recharge	-	900	900	900	900	900	Design
Total				-	4,765	4,765	8,165	8,235	8,235	

PROJECT CONCEPTS

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse ¹							Project Phase
				2020	2025	2030	2035	2040	2045	
Olivenhain MWD	Connection #1 - North City Water Reclamation Plant/City of San Diego (Extension 153)	Tertiary	Landscape	-	-	489	489	489	489	Concept
	Joint RW Transmission Project with SFID and OMWD/TBD (Bridges)	Tertiary	Landscape, Golf Course Irrigation	-	-	400	400	400	400	Concept
	Rancho Cielo	Tertiary	Landscape	-	-	100	100	100	100	Concept
	SEJPA 1 (Gardenview Rd)	Tertiary	Landscape	-	-	44	44	44	44	Concept
	Sub-total			-	-	1,033	1,033	1,033	1,033	
Otay WD	North District Recycled System/ R.W. Chapman WRF/Otay WD	Tertiary	Landscape	-	-	-	4,400	4,400	4,400	Concept
Valley Center MWD	Lower Moosa Canyon WRF	Tertiary	Landscape Irrigation		460	580	700	700	700	FS
	Welk WRF/VCMWD	Tertiary	Landscape/Golf Course Irrigation	-	140	140	140	140	140	FS
	Lilac Hills Ranch WRF/VCMWD	Tertiary	Landscape Irrigation	-	-	-	147	294	294	FS
	Meadowood WRF/VCMWD	Tertiary	Landscape Irrigation	-	100	143	143	143	143	FS
	Woods Valley Ranch WRF (Phase 3)/VCMWD	Tertiary	Landscape Irrigation	-	-	50	150	168	168	FS
	North Village WRF (Phase 4)/VCMWD	Tertiary	Landscape Irrigation	-	-	-	-	105	105	FS
	Sub-total			-	700	913	1,280	1,550	1,550	
Total				-	700	1,946	6,713	6,983	6,983	

¹ Does not include recycled water used for environmental enhancement.

² Projected verifiable projects are included in the Water Authority's 2020 UWMP reliability analysis.

³ If the ECAWP project moves forward, the Ray Stoyer WRF will be replaced by a new WRF operated by the JPA. If the ECAWP does not move forward, the Ray Stoyer WRF will be rehabbed or replaced, so the supply amount is verifiable.

⁴ Recycled supplies used for replenishment of Santee Lakes are not reflected in the demand forecast; therefore are not included here as a source.

Appendix F - Member Agency Local Supply Projections

Table F-5 (DRAFT)
Member Agency Potable Reuse Projections

EXISTING POTABLE REUSE PROJECTS AND PROPOSED EXPANSIONS (VERIFIABLE)

Lead Agency	Project Name	Source Water Purveyor (if different from lead agency)	Source Water Facility	Project Type (i.e. direct, indirect)	Projected Verifiable Use (AF/YR)					
					2020	2025	2030	2035	2040	2045
East County Advanced Water Purification JPA (Helix WD)	East County Advanced Water Purification JPA		East County Advanced Water Purification Facility / East County Advanced Water Purification JPA	Indirect	-	8,882	8,882	8,882	8,882	8,882
East County Advanced Water Purification JPA (Padre Dam MWD)	East County Advanced Water Purification JPA		East County Advanced Water Purification Facility / East County Advanced Water Purification JPA	Indirect	-	4,000	4,000	4,000	4,000	4,000
Oceanside, City of	Pure Water Oceanside	Oceanside, City of	San Luis Rey WRF	Indirect	-	3,360	6,720	6,720	6,720	6,720
San Diego, City of	Pure Water San Diego	San Diego, City of	Phase 1 North City / City of San Diego	Indirect	-	16,800	33,600	33,600	33,600	33,600
	Pure Water San Diego	San Diego, City of	Phase 2 Central Area/ City of San Diego	Indirect	-	-	-	59,360	59,360	59,360
	Sub-total				-	16,800	33,600	92,960	92,960	92,960
Total					-	33,042	53,202	112,562	112,562	112,562

ADDITIONAL PLANNED PROJECTS

Lead Agency	Project Name	Source Water Purveyor (if different from lead agency)	Supply Source Treatment Plant/Agency	Project Type (i.e. direct, indirect)	Projected Additional Planned (AF/YR)					
					2020	2025	2030	2035	2040	2045
Total					-	-	-	-	-	-

Appendix F - Member Agency Local Supply Projections

Table F-5 (DRAFT)
Member Agency Potable Reuse Projections (continued)

PROJECT CONCEPTS

Lead Agency	Project Name	Source Water Purveyor (if different from lead agency)	Supply Source Treatment Plant/Agency	Project Type (i.e. direct, indirect)	Conceptual (AF/YR)					
					2020	2025	2030	2035	2040	2045
Carlsbad MWD	North County One Water Program	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Indirect/ Direct				3,500	3,500	3,500
East County Advanced Water Purification JPA (Helix WD)	East County Advanced Water Purification JPA potential expansion		East County Advanced Water Purification Facility/ East County Advanced Water Purification JPA	Indirect	-	-	-	-	-	1,931
East County Advanced Water Purification JPA (Padre Dam MWD)	East County Advanced Water Purification JPA potential expansion		East County Advanced Water Purification Facility/ East County Advanced Water Purification JPA	Indirect	-	-	-	-	-	869
Escondido, City of	Potable Reuse	Escondido, City of	Hale Avenue Resource Recovery Facility (HARRF) / City of Escondido	TBD	-	-	-	4,000	5,000	5,000
Olivenhain MWD	San Dieguito River Basin Brackish GW Recovery & Treatment	San Elijo JPA/Leucadia Wastewater District	San Elijo JPA/Leucadia Wastewater District	Indirect	-	-	1,120	1,120	1,120	1,120
	North County One Water Program	Encina Water Pollution Control Facility (EWPCF) and San Elijo Water Reclamation Facility (SEWRF)	Encina Water Pollution Control Facility (EWPCF) and San Elijo Water Reclamation Facility (SEWRF)	Indirect/ Direct	-	-	-	2,500	2,500	2,500
	Sub-total				-	-	1,120	3,620	3,620	3,620
Poway, City of	North County One Water Program	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Indirect/ Direct	-	-	-	2,000	2,000	2,000
San Dieguito WD	North County One Water Program	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Indirect/ Direct	-	-	-	2,000	2,000	2,000
Santa Fe ID	North County One Water Program	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Encina Water Pollution Control Facility (EWPCF) and the San Elijo Water Reclamation Facility (SEWRF)	Indirect/ Direct	-	-	-	3,000	3,000	3,000
Vallecitos WD	North County One Water Program	Encina Wastewater Authority/ San Elijo Joint Powers Authority	Encina Water Pollution Control Facility/ San Elijo Water Reclamation Facility (Advanced Treatment)	Indirect or Direct	-	-	5,500	5,500	5,500	5,500
	Meadowlark Water Reclamation Facility Direct Potable Reuse		Meadowlark Water Reclamation Facility	Direct	-	-	2,200	2,200	2,200	2,200
	Sub-total				-	-	7,700	7,700	7,700	7,700
Total					-	-	8,820	25,820	26,820	29,620

Table F-6 (DRAFT)
Member Agency Seawater Desalination Projections

EXISTING DESALINATION PROJECTS AND PROPOSED EXPANSIONS (VERIFIABLE)

Lead Agency	Project Name	Projected Verifiable Use (AF/YR)					
		2020	2025	2030	2035	2040	2045
Supplies to be purchased by Carlsbad MWD	Claude "Bud" Lewis Carlsbad Desalination Plant	2,500	2,500	2,500	2,500	2,500	2,500
Supplies to be purchased by Vallecitos WD	Claude "Bud" Lewis Carlsbad Desalination Plant	3,500	3,500	3,500	3,500	3,500	3,500

Total

6,000	6,000	6,000	6,000	6,000	6,000	6,000
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ADDITIONAL PLANNED PROJECTS

Lead Agency	Project Name	Projected Additional Planned (AF/YR)					
		2020	2025	2030	2035	2040	2045

Total

-	-	-	-	-	-	-
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PROJECT CONCEPTS

Lead Agency	Project Name	Conceptual (AF/YR)					
		2020	2025	2030	2035	2040	2045
Otay WD	Otay WD/ Rosarito Beach	-	-	6,700	6,700	6,700	6,700

Total

-	-	6,700	6,700	6,700	6,700	6,700
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Table F-7 (DRAFT)
Member Agency Water Transfers

EXISTING WATER TRANSFERS (VERIFIABLE)

Agency	Project Name	Projected Verifiable Use (AF/YR)					
		2020	2025	2030	2035	2040	2045
Escondido, City of	San Luis Rey Water Transfer	7,900	7,900	7,900	7,900	7,900	7,900
Vista Irrigation District	San Luis Rey Water Transfer	7,900	7,900	7,900	7,900	7,900	7,900

Total

15,800	15,800	15,800	15,800	15,800	15,800	15,800
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ADDITIONAL PLANNED WATER TRANSFERS

Lead Agency	Project Name	Projected Additional Planned (AF/YR)					
		2020	2025	2030	2035	2040	2045

Total

-	-	-	-	-	-	-
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CONCEPTUAL WATER TRANSFERS

Lead Agency	Project Name	Conceptual (AF/YR)					
		2020	2025	2030	2035	2040	2045

Total

-	-	-	-	-	-	-
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Appendix G: Water Authority Demands Provided by Metropolitan

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Draft

(November 18, 2020)

San Diego County Water Authority

Normal Year

(Average of 1922-2004 Hydrology)

Demographics¹	2025	2030	2035	2040	2045
Population	3,442,340	3,536,336	3,623,655	3,709,299	3,789,443
Occupied Housing Units	1,194,633	1,264,598	1,334,765	1,389,392	1,427,352
Single Family	691,386	708,907	726,025	738,997	749,553
Multi-Family	503,247	555,691	608,740	650,395	677,799
Persons Per Household	2.79	2.71	2.63	2.59	2.58
Urban Employment	1,557,846	1,625,971	1,699,811	1,765,994	1,821,783

Conservation	2025	2030	2035	2040	2045
Conservation ²	150,283	165,527	183,180	199,393	213,462
Installed Active Device Through FY2019/20	13,666	7,718	6,386	5,564	3,971
Code-Based and Price-Effect Savings	136,617	157,808	176,795	193,829	209,491

Total Demands After Conservation	2025	2030	2035	2040	2045
Total Demand	528,100	561,610	571,719	578,982	585,598
Retail Municipal and Industrial ³	493,484	506,748	518,260	526,736	533,530
Retail Agricultural	31,642	49,924	48,486	47,240	47,025
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	2,974	4,938	4,972	5,007	5,042

Local Supplies	2025	2030	2035	2040	2045
Total Local Supplies	176,236	211,163	213,491	215,684	217,813
Groundwater Production	13,300	13,300	13,300	13,300	13,300
Surface Production	51,180	51,180	51,180	51,180	51,180
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	50,500	50,500	50,500	50,500	50,500
Groundwater Recovery	11,099	11,750	12,213	12,606	12,962
Recycling	50,157	84,433	86,298	88,098	89,871
M&I and Agricultural	47,183	79,496	81,326	83,090	84,829
Groundwater Replenishment	2,974	4,938	4,972	5,007	5,042
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2025	2030	2035	2040	2045
Total Metropolitan Demands	351,864	350,446	358,228	363,300	367,785
Consumptive Use	351,864	350,446	358,228	363,300	367,785
Seawater Barrier	0	0	0	0	0
Replenishment Water ⁴	0	0	0	0	0

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2020 Regional Transportation Plan and SANDAG Series 14 Forecast (Version 17).

2. Includes code-based, price-effect and existing active savings through fiscal year 2019/20.

Does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.

3. Retail M&I projections include conservation.

4. Replenishment Water include direct and in-lieu replenishment.

Draft

(November 18, 2020)

San Diego County Water Authority*Single Dry-Year*

(Repeat of 1977 Hydrology)

Demographics¹	2025	2030	2035	2040	2045
Population	3,442,340	3,536,336	3,623,655	3,709,299	3,789,443
Occupied Housing Units	1,194,633	1,264,598	1,334,765	1,389,392	1,427,352
Single Family	691,386	708,907	726,025	738,997	749,553
Multi-Family	503,247	555,691	608,740	650,395	677,799
Persons Per Household	2.79	2.71	2.63	2.59	2.58
Urban Employment	1,557,846	1,625,971	1,699,811	1,765,994	1,821,783

Conservation	2025	2030	2035	2040	2045
Conservation ²	150,283	165,527	183,180	199,393	213,462
Installed Active Device Through FY2019/20	13,666	7,718	6,386	5,564	3,971
Code-Based and Price-Effect Savings	136,617	157,808	176,795	193,829	209,491

Total Demands After Conservation	2025	2030	2035	2040	2045
Total Demand	526,033	559,420	569,488	576,724	583,313
Retail Municipal and Industrial ³	491,542	504,754	516,221	524,663	531,431
Retail Agricultural	31,517	49,728	48,295	47,054	46,840
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	2,974	4,938	4,972	5,007	5,042

Local Supplies	2025	2030	2035	2040	2045
Total Local Supplies	171,212	206,139	208,467	210,660	212,789
Groundwater Production	13,300	13,300	13,300	13,300	13,300
Surface Production	48,656	48,656	48,656	48,656	48,656
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	48,000	48,000	48,000	48,000	48,000
Groundwater Recovery	11,099	11,750	12,213	12,606	12,962
Recycling	50,157	84,433	86,298	88,098	89,871
M&I and Agricultural	47,183	79,496	81,326	83,090	84,829
Groundwater Replenishment	2,974	4,938	4,972	5,007	5,042
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2025	2030	2035	2040	2045
Total Metropolitan Demands	354,822	353,280	361,022	366,065	370,524
Consumptive Use	354,822	353,280	361,022	366,065	370,524
Seawater Barrier	0	0	0	0	0
Replenishment Water ⁴	0	0	0	0	0

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2020 Regional Transportation Plan and SANDAG Series 14 Forecast (Version 17).

2. Includes code-based, price-effect and existing active savings through fiscal year 2019/20.

Does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.

3. Retail M&I projections include conservation.

4. Replenishment Water include direct and in-lieu replenishment.

San Diego County Water Authority

5-Consecutive Drought Years

(Repeat of 1988-1992 Hydrology)

Demographics¹	2025	2030	2035	2040	2045
Population	3,442,340	3,536,336	3,623,655	3,709,299	3,789,443
Occupied Housing Units	1,194,633	1,264,598	1,334,765	1,389,392	1,427,352
Single Family	691,386	708,907	726,025	738,997	749,553
Multi-Family	503,247	555,691	608,740	650,395	677,799
Persons Per Household	2.79	2.71	2.63	2.59	2.58
Urban Employment	1,557,846	1,625,971	1,699,811	1,765,994	1,821,783

Conservation	2025	2030	2035	2040	2045
Conservation ²	150,283	165,527	183,180	199,393	213,462
Installed Active Device Through FY2019/20	13,666	7,718	6,386	5,564	3,971
Code-Based and Price-Effect Savings	136,617	157,808	176,795	193,829	209,491

Total Demands After Conservation	2025	2030	2035	2040	2045
Total Demand	521,079	554,538	573,922	582,421	589,286
Retail Municipal and Industrial ³	494,700	507,000	519,352	529,156	536,709
Retail Agricultural	24,564	43,050	49,610	48,272	47,549
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	1,815	4,489	4,959	4,993	5,028

Local Supplies	2025	2030	2035	2040	2045
Total Local Supplies	149,743	197,287	207,051	209,287	211,439
Groundwater Production	13,300	13,300	13,300	13,300	13,300
Surface Production	44,954	44,954	44,954	44,954	44,954
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	51,200	51,200	51,200	51,200	51,200
Groundwater Recovery	10,329	11,516	12,035	12,452	12,821
Recycling	29,960	76,317	85,562	87,381	89,163
M&I and Agricultural	28,144	71,828	80,603	82,387	84,135
Groundwater Replenishment	1,815	4,489	4,959	4,993	5,028
Seawater Barrier	0	0	0	0	0
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2025	2030	2035	2040	2045
Total Metropolitan Demands	371,337	357,251	366,870	373,135	377,848
Consumptive Use	371,337	357,251	366,870	373,135	377,848
Seawater Barrier	0	0	0	0	0
Replenishment Water ⁴	0	0	0	0	0

All units are acre-feet except in Demographics Section.

1. Growth projections are based on SCAG 2020 Regional Transportation Plan and SANDAG Series 14 Forecast (Version 17).

2. Includes code-based, price-effect and existing active savings through fiscal year 2019/20.

Does not include future active conservation savings. Conservation is 1990 base year. Pre-1990 add 250,000 acre-feet.

3. Retail M&I projections include conservation.


4. Replenishment Water include direct and in-lieu replenishment.

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Appendix H: Distribution System Water Losses

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Appendix H - Distribution System Water Losses



AWWA Free Water Audit Software:
Reporting Worksheet

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+ Click to add a comment

Water Audit Report for: San Diego/San Diego County Water Authority (CA3710042 (Water Sys ID))
Reporting Year: 2018 7/2017 - 6/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

----- Enter grading in column 'E' and 'J' -----

WATER SUPPLIED

Volume from own sources:	+	?	7	130,645.700	acre-ft/yr
Water imported:	+	?	7	65,698.000	acre-ft/yr
Water exported:	+	?	n/a	0.000	acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:	+	?	4	143.710	acre-ft/yr
	+	?	4	-109.180	acre-ft/yr
	+	?			acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED:
196,309.170
acre-ft/yr

AUTHORIZED CONSUMPTION

Billed metered:	+	?	8	184,889.800	acre-ft/yr
Billed unmetered:	+	?	8	11,085.890	acre-ft/yr
Unbilled metered:	+	?	n/a		acre-ft/yr
Unbilled unmetered:	+	?	10	100.000	acre-ft/yr

AUTHORIZED CONSUMPTION:
196,075.690
acre-ft/yr

Click here: ? for help using option buttons below

Use buttons to select percentage of water supplied OR value

Pcnt:	+	?	10	100.000	acre-ft/yr
-------	---	---	----	---------	------------

Pcnt:	+	?	10	0.001	acre-ft/yr
-------	---	---	----	-------	------------

Pcnt:	+	?	10	381.920	acre-ft/yr
-------	---	---	----	---------	------------

Pcnt:	+	?	10	184.890	acre-ft/yr
-------	---	---	----	---------	------------

WATER LOSSES (Water Supplied - Authorized Consumption)

233.480
acre-ft/yr

Apparent Losses

Unauthorized consumption:	+	?	10	0.001	acre-ft/yr
Customer metering inaccuracies:	+	?	1	381.920	acre-ft/yr
Systematic data handling errors:	+	?	2	184.890	acre-ft/yr

Apparent Losses:
566.811
acre-ft/yr

Check input values; APPARENT LOSSES should be less than WATER LOSSES

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:
-333.331
acre-ft/yr

WATER LOSSES:
233.480
acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:
333.480
acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	150.0	miles
Number of <u>active AND inactive</u> service connections:	+	?	10	68	
Service connection density:	?			0	conn./mile main

Are customer meters typically located at the curbside or property line? Yes (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: + ? 8 235.0 psi

COST DATA

Total annual cost of operating water system:	+	?	10	\$550,363,632	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	\$4.83	\$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+	?	5	\$1,282.00	\$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

*** YOUR SCORE IS: 70 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies


3: Systematic data handling errors

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Reporting Worksheet 1

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Appendix H - Distribution System Water Losses



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Water Audit Report for: San Diego/San Diego County Water Authority (CA3710042 (Water Sys ID))
Reporting Year: 2019 7/2018 - 6/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

WATER SUPPLIED

Volume from own sources:	+	?	7	109,100.200	acre-ft/yr
Water imported:	+	?	7	58,630.900	acre-ft/yr
Water exported:	+	?	n/a	0.000	acre-ft/yr

WATER SUPPLIED:
167,647.880
acre-ft/yr

Master Meter and Supply Error Adjustments

Pcnt:	+	?	4	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	109.150	acre-ft/yr
	+	?	4	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	-25.930	acre-ft/yr
	+	?		<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>		acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Billed metered:	+	?	8	163,891.800	acre-ft/yr
Billed unmetered:	+	?	8	3,620.020	acre-ft/yr
Unbilled metered:	+	?	n/a		acre-ft/yr
Unbilled unmetered:	+	?	10	45.117	acre-ft/yr

AUTHORIZED CONSUMPTION:
167,556.937
acre-ft/yr

Click here: ?
for help using option buttons below

Pcnt:

 Value: 45.117 acre-ft/yr

Use buttons to select percentage of water supplied
OR
value

Pcnt:

 Value: 0.001 acre-ft/yr

302.277 acre-ft/yr

163.892 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

WATER LOSSES:
90.943
acre-ft/yr

Apparent Losses

Unauthorized consumption:	+	?	10	0.001	acre-ft/yr
Customer metering inaccuracies:	+	?	1	302.277	acre-ft/yr
Systematic data handling errors:	+	?	2	163.892	acre-ft/yr

Apparent Losses:
466.170
acre-ft/yr

Check input values; APPARENT LOSSES should be less than WATER LOSSES

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses:
-375.227
acre-ft/yr

WATER LOSSES:
90.943
acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER:
136.060
acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	+	?	9	150.0	miles
Number of <u>active AND inactive</u> service connections:	+	?	10	68	
Service connection density:	?			0	conn./mile main

Are customer meters typically located at the curbside or property line? Yes (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:

 235.0 psi

COST DATA

Total annual cost of operating water system:	+	?	10	\$560,290.327	\$/Year
Customer retail unit cost (applied to Apparent Losses):	+	?	9	\$4.94	\$/1000 gallons (US)
Variable production cost (applied to Real Losses):	+	?	5	\$1,307.00	\$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 70 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Customer metering inaccuracies

2: Volume from own sources

3: Systematic data handling errors

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Reporting Worksheet 1

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Appendix I: Water Authority's Energy Intensity Calculations

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Appendix I: San Diego County Water Authority's Energy Intensity Calculations

Introduction

Formed in 1944, the San Diego County Water Authority (Water Authority) provides wholesale water supply to 24 member agencies that span the vast majority of San Diego County and serve 97% of the county's population. The Water Authority imports approximately 90% of the water used in San Diego County and operates and maintains the San Diego region's aqueduct delivery system, which consists of approximately 310 miles of large-diameter pipeline in two aqueducts and approximately 1,400 aqueduct-related structures.

Water-Related Greenhouse Gases

The Water Authority utilizes a primarily gravity flow system. The majority of energy use goes toward treating, conveying, and storing the water. The State of California has adopted policies and goals to reduce human emissions of greenhouse gases (GHGs). In response, the Water Authority has voluntarily developed and recently updated its Climate Action Plan (CAP) in 2020. The Water Authority's GHG emissions inventory for 2019 totaled 3,403 metric tons, predominately from electricity required for water conveyance and treatment. This does not include water conveyance to end-users as those are captured in communitywide, member-agency inventories, or water supply contracts with private companies such as the Lewis Carlsbad Desal Plant, as the Water Authority does not have operational control over those deliveries.

The Water Authority's Twin Oaks Valley Water Treatment Plant (WTP) was responsible for 29% of its emissions in 2019 (873 MT CO_{2e}). Pump stations were the next largest source of emissions, accounting for 12% of total emissions (354 MT CO_{2e}).

Energy Use Reporting

In 2015, the Water Authority chose to voluntarily provide information on its estimated energy usage in its Urban Water Management Plan (SB1036, Pavely-2014). Water Energy intensity is the total amount of energy, calculated on a whole-system basis, required for the delivery and treatment of a given amount of water. Now that energy use reporting is mandatory in 2020, the Water Authority has chosen to utilize the same approach as it did in 2015 following 2020 DWR guidance. This section describes the total amount of energy directly expended by the Water Authority on a per acre-foot basis to take water from the Water Authority's source of supply to the point of delivery to its retail agency customers. It does not include energy used to convey or treat water outside of the Water Authority's control. This includes: the estimated amount of energy used to convey raw water supplies to the water treatment plants or member agency connections; the amount of energy used to treat water supplies; and the estimated energy used to distribute treated water supplies. It also includes consequential energy generation which is produced concurrent with water deliveries and non-consequential energy

generation that is not directly associated with water deliveries. The following assumptions were made in calculating the Water Authority's energy intensity:

Water Data (Volume-AF): This analysis includes water flow data from Calendar Year (CY) 2018 and CY 2019. Untreated water conveyance includes deliveries from Metropolitan, except deliveries to the Twin Oaks Water Treatment Plant. Distribution system deliveries include treated water supplies delivered from Metropolitan and the Twin Oaks Water Treatment Plant.

Energy Consumption (kWh):

1. Energy Consumption includes only facilities that the Water Authority operates and maintains related to the delivery of water. These are:

- (a) Aqueduct facilities with the energy allocated accordingly between untreated water conveyance and treated deliveries;
- (b.) Twin Oaks Valley Water Treatment Plant;
- (c) Water Authority pump stations located on the aqueduct system.

Water from the Carlsbad desalination plant is not included as this is energy embedded in water supplies by an upstream water supplier (Poseidon Water) and is not within the Water Authority's operational control and the Water Authority does not have authority over normal business operations at the operational level.

2. Consequential energy includes Hodges pumping operations for deliveries to the aqueduct and Rancho Peñasquitos Pressure Control Hydroelectric Facility (PCHF) because without water flowing these facilities would not generate energy

3. Non-Consequential energy production includes the Hodges water management generation used to regulate lake levels.

4. Solar generation behind meter is netted out to zero against usage and is not directly counted.

Source

Water is imported through the Metropolitan Water District of Southern California (Metropolitan), from the Colorado River and the State Water Project. The Water Authority's delivery system includes pipelines delivering untreated and treated water supplies.

Untreated water supplies come from the Colorado River Aqueduct and the State Water Project, and are blended together at the San Diego Canal. Lake Skinner, owned by Metropolitan, is the primary storage for the San Diego Aqueduct. Untreated water from Lake Skinner flows directly into pipelines 3 and 5 while pipelines 1, 2 and 4 receive treated water from the Skinner Filtration Plant. The Water Authority takes delivery of imported water from Metropolitan in the five pipelines within the two San Diego Aqueducts, approximately six miles south of the of Riverside-San Diego County line.

Conveyance (Untreated Water Deliveries)

Gravity flow is the primary means of delivering water to Member Agencies and, therefore, very little pumping (and electricity use) is required for treated water deliveries. Conveyance includes energy used

Appendix I - Water Authority's Energy Intensity Calculations

for: Escondido , San Vicente, Olivenhain and Lake Hodges Pump Stations; untreated small facilities (miscellaneous, flow control, rectifiers) with Oceanside 2-3-5 and San Diego Santa Fe 3-4-5 split as both untreated and treated with 100-percent of their energy used for conveyance. Rancho Peñasquitos PCHF not only provides pressure control for water delivery but also uses generators to produce electricity from water flowing through the pipeline. This energy is counted as consequential and is included as a negative number. This results in a net negative energy for the operation of the conveyance system.

	CY 2018	CY 2019
Water Delivered (AF)	261,995	205,982
Energy Used (kWh)	-8,976,341	-6,712,508
Energy Intensity (kWh/AF)	-34.3	-32.6

Treatment

The Water Authority's Twin Oaks Valley Water Treatment Plant is used to provide treated water to its Member Agencies. The estimated amount of energy used to treat water supplies has been calculated by dividing the annual amount of energy consumed at the plant by the amount of water treated.

	CY 2018	CY 2019
Water Delivered (AF)	46,912	28,664
Energy Used (kWh)	5,058,836	3,212,796
Energy Intensity (kWh/AF)	107.8	112.1

Distribution (Treated Water Deliveries)

Energy is consumed by other small facilities as well as the Valley Center Pump Station for the delivery of treated water. Twin Oaks Water Treatment Plant was not included, since its energy was counted under the Treatment section.

	CY 2018	CY 2019
Water Delivered (AF)	159,515	126,526
Energy Used (kWh)	1,772,050	971,042
Energy Intensity (kWh/AF)	11.1	7.7

Non-Consequential

Lake Hodges' non-consequential use applies to generated energy produced when managing reservoir levels. This is calculated as banked pumped energy minus banked energy generation and is included as a negative number per DWR. Energy related to pumped storage at Lake Hodges is not included.

Appendix I - Water Authority's Energy Intensity Calculations

	CY 2018	CY 2019
Water Delivered (AF)	422	4,339
Energy Used (kWh)	-1386	-4062
Energy Intensity (kWh/AF)	-3.3	-0.9

Summary

The Water Authority's highest energy intensity comes from treating water. Due to the clean energy generated from the Rancho Peñasquitos PCHF facility, this energy intensity is offset to make the total utility energy intensity negative for the Water Authority; helping the State meet its clean energy and greenhouse gas reduction goals.

Appendix J: Reporting on Reduced Delta Reliance

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Appendix J – Reporting on Reduced Delta Reliance

Background

An urban water supplier that anticipates participating in or receiving water from a proposed project, such as a multiyear water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Sacramento-San Joaquin Delta (Delta), should provide information in their 2015 and 2020 UWMPs that can then be used in the certification of consistency process to demonstrate consistency with Delta Plan Policy WR P1, *Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance* (California Code Regulations, Title 23, §5003).¹

Delta Plan Policy WR P1 is one of fourteen regulatory policies in the Delta Plan. The Delta Plan is a comprehensive, long-term, legally enforceable plan guiding how federal, state, and local agencies manage the Delta's water and environmental resources. The Delta Plan was adopted in 2013 by the Delta Stewardship Council (DSC). Delta Plan Policy WR P1 identifies urban water management plans (UWMP) as the tool to demonstrate consistency with the state policy that suppliers that carry out or take part in covered actions must reduce their reliance on the Delta.²

The California Code of Regulations, Title 23, § 5003(c)(1), states that commencing in 2015, water suppliers that have done all of the following are contributing to reduced reliance on the Delta and improving regional self-reliance and are therefore consistent with Delta Plan Policy WR P1:

- (A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;
- (B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and
- (C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

¹ *Draft Urban Water Management Plan Guidebook 2020*, California Department of Water Resources, August 2020, p. C-1.

² *Ibid.*, p. C-2.

The Water Authority's information on its reduced reliance on the Delta is documented below and can be used in future certifications of consistency with WR P1 for potential future water supply covered actions in the Delta.

Process to Demonstrate Reduced Reliance on Delta

Consistent with Appendix C in the California Department of Water Resource's *Draft UWMP Guidebook 2020*³ (DWR Guidebook), the analysis followed Steps 2 through 4 in the DWR Guidebook to document consistency with WR P1 and produce data and information covering the Water Authority's 2015 and 2020 UWMPs. It should be noted that Step 1 of the DWR Guidebook process applies to water suppliers that do not quantify the water use efficiency supply volumes in their UWMPs. The Water Authority quantifies this information in its UWMPs, therefore, Step 1 of the process was not included in the analysis.⁴ A list of Steps 1 through 4 is shown below.

- 1) Quantify the water use efficiency supply volume (not applicable);
- 2) Quantify total water supplies;
- 3) Quantify water supplies that contribute to regional self-reliance; and
- 4) Demonstrate reduced reliance on water supplies from the Delta watershed.

Unless otherwise noted, the sources of the data used in the analysis are shown in Table 1.

Table 1 – Source of Water Supply Data

Analysis Year	Data Source	
2010 (Baseline)	2005 UMWP	Tables 2-2 and 8-1
2015	2010 UWMP	Tables 2-5 and 9-1
2020	2015 UWMP	Tables 2-4 and 9-1
2025, 2030, 2035, 2040, 2045	2020 UWMP	Tables 2-4 and 9-1

Quantification of Total Water Supplies

To demonstrate reduced reliance on the Delta, the Water Authority compared its projected Delta water use against a baseline. The baseline, shown in Table 2, was calculated by taking the projected 2010 normal year water demand and adding projected water efficiency savings for 2010. Consistent with DWR's Guidebook, normal year water demands were used as a surrogate for normal year water supplies to help alleviate issues associated with instances where available water supplies exceed normal year water demands.⁵ In addition, consistent with the DWR

³ *Ibid.*, p. C-6.

⁴ *Ibid.*, p. C-14.

⁵ *Ibid.*, p. C-16.

Guidebook, actual water use was not used for the current year due to the influence of weather and other variables on water use.⁶ Rather, UWMP normal year demand projections were used to represent current and future water use.

Table 2 – Service Area Water Demands without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015 ^a	2020	2025	2030	2035	2040	2045 (opt)
Service Area Water Demands with Water Use Efficiency	715,450	647,285	587,581	555,758	578,244	598,474	614,235	630,771
Saving from Water Use Efficiency	79,960	6,737	74,141	62,411	66,921	73,035	81,625	85,698
Service Area Water Demands without Water Use Efficiency	795,410	654,022	661,722	618,169	645,165	671,509	695,860	716,469

^a Consistent with SBX7-7 guidelines, water use efficiency targets could be met through both recycled water supplies and additional conservation savings. For 2015, the savings from water use efficiency represents the additional increment of water use efficiency required to meet the region's water use efficiency target under SBX7-7 after accounting for available recycled water supplies.

Quantification of Water Supplies that Contribute to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report in their UWMP the expected outcome for measurable improvement in regional self-reliance as a reduction in water used from the Delta watershed. To determine whether there is an increase in regional self-reliance, the baseline calculated in Table 2 is used to compare against the water supplies listed in Table 3 that contribute to regional self-reliance. The comparison is done over five-year periods, from 2015 through 2045, to calculate how regional self-reliance will change over time.

Table 3 lists the sources of water supplies and volumes that contribute to regional self-reliance. As shown in the table, the Water Authority's reliance on the Delta watershed decreases over time as the percent of water supplies that contribute to regional self-reliance increase over time. The volumes of the individual supplies that contribute to regional self-reliance can be found in Section 8 of the Water Authority's 2005 UWMP, and Section 9 of the Water Authority's 2010, 2015, and 2020 UWMPs.

The water supplies included in Table 3 that contribute to regional self-reliance are grouped into categories that are consistent with the DWR Guidebook and represent Water Authority and member agency verifiable supplies. Recycled water supplies are listed in the "Water Recycling" category. Water supplies from the Carlsbad Desalination Plant are listed in the "Advanced Water Technologies" category. The remaining water supplies are included in the "Local and Regional Water Supply and Storage Projects" category, and consist of water supplies from the Imperial Irrigation District water transfer, All-American and Coachella Canal lining projects, groundwater, brackish groundwater, surface water, potable reuse, and San Luis Rey water transfers. Since supplies from the Metropolitan Water District of Southern California (Metropolitan) may include a percentage of water from the Delta watershed, Metropolitan supplies are excluded from the list of supplies that contribute to regional self-reliance in the San Diego region.

⁶ *Ibid.*, p. C-7.

Table 3 – Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Water Use Efficiency	79,960	6,737	74,141	62,411	66,921	73,035	81,625	85,698
Water Recycling	33,668	38,660	40,459	42,993	46,493	46,593	46,693	46,793
Stormwater Capture and Use	-	-	-	-	-	-	-	-
Advanced Water Technologies	-	-	56,000	56,000	56,000	56,000	56,000	56,000
Conjunctive Use Projects	-	-	-	-	-	-	-	-
Local and Regional Water Supply and Storage Projects	235,924	250,436	355,120	402,599	423,959	484,021	480,521	480,521
Other Programs and Projects the Contribute to Regional Self-Reliance	-	-	-	-	-	-	-	-
Water Supplies Contributing to Regional Self-Reliance	349,552	295,833	525,720	564,003	593,373	659,649	664,839	669,012
Service Area Water Demands without Water Use Efficiency	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Service Area Water Demands without Water Use Efficiency	795,410	654,022	661,722	618,169	645,165	671,509	695,860	716,469
Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Water Supplies Contributing to Regional Self-Reliance	349,552	295,833	525,720	564,003	593,373	659,649	664,839	669,012
Change in Water Supplies Contributing to Regional Self-Reliance		(53,719)	176,168	214,451	243,821	310,097	315,287	319,460
Change in Percentage Regional Self Reliance (As a Percent of Water Demand without WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Percentage of Water Supplies Contributing to Regional Self-Reliance	43.9%	45.2%	79.4%	91.2%	92.0%	98.2%	95.5%	93.4%
Change in Percentage of Water Supplies Contributing to Regional Self-Reliance		102.9%	180.8%	207.6%	209.3%	223.5%	217.4%	212.5%

Demonstration of Reduced Reliance on Water Supplies from the Delta Watershed

WR P1 subdivision (c)(1)(C) requires water suppliers to report on the expected outcomes for measurable reductions in water supplies from the Delta watershed. For the Water Authority and its member agencies, the only potential source of water from the Delta watershed is water purchased from Metropolitan. Because water provided by Metropolitan to the Water Authority and its member agencies can include supplies that comingle Delta watershed and Colorado River supplies, the Water Authority and its member agencies must wholesale incorporate the Metropolitan's forecast (TABLE 4) as a reasonable methodology to forecast the percent of Metropolitan water supply from the Delta watershed and the Colorado River, at least until Metropolitan provides the methodology approved by the Delta Stewardship Council as anticipated.

To serve as placeholder for the WR P1 subdivision (c)(1)(C) requirement, the information in Table 4 is presented from Appendix 11 of Metropolitan's *Draft 2020 UWMP*.⁷ The table calculates the reduced reliance on the Delta watershed within the entirety of the Metropolitan service area.

⁷ *Draft 2020 UWMP*, Metropolitan Water District of Southern California, February 2021, Appendix 11, Table A.11-3.

Table 4 – Calculation of Reliance on Water Supplies from Delta Watershed ⁸

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,108,670	1,108,670	1,108,670	993,980	993,980
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-
Transfers and Exchanges	20,000	44,000	91,000	8,000	8,000	8,000	8,000	8,000
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,116,670	1,116,670	1,116,670	1,001,980	1,001,980

Service Area Water Demands without Water Use Efficiency	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Service Area Water Demands without Water Use Efficiency Savings	5,493,000	5,499,000	5,219,000	4,598,000	4,737,000	4,877,000	4,981,000	5,100,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Total Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,116,670	1,116,670	1,116,670	1,001,980	1,001,980
Change in Water Supplies from the Delta Watershed		(419,000)	(417,000)	(375,330)	(375,330)	(375,330)	(490,020)	(490,020)

Change in Percentage of Supplies from the Delta Watershed (As a Percent of Water Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (opt)
Percentage of Total Water Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.3%	23.6%	22.9%	20.1%	19.6%
Change in Percentage of Water Supplies from the Delta Watershed		-7.6%	-6.6%	-2.9%	-3.6%	-4.3%	-7.0%	-7.5%

The CVP/SWP contract supplies in Table 4 include Metropolitan's State Water Project Table A and Article 21 supplies.⁹ The values in Table 4 do not include supplies from San Luis Carryover storage or Central Valley storage programs. The transfers and exchanges of supplies from the Delta watershed shown in Table 4 include supplies from the San Bernardino Valley MWD Program, Yuba River Accord Purchase Program, the San Gabriel Valley MWD Program, and other generic SWP and Central Valley transfers and exchanges. Additional information can be found in Section 3.2 and Appendix 3 of Metropolitan's *Draft 2020 UWMP*.¹⁰

⁸ Metropolitan Water District of Southern California, *Draft 2020 UWMP*, February 2021, Appendix 11, Table A.11-3.

⁹ *Ibid.*, p. A.11-7.

¹⁰ *Ibid.*, pgs. A.11-7 – 11-8.

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Appendix K: Potential Near-Term Annexations

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Appendix K - Potential Near-Term Annexations

Appendix K Near-term Annexations			
Projected Demands for Proposed Near-term Annexations			
Member Agency	Potential Annexation	Estimated Annual Demands (AFY)	
		2025	Post-2025
Carlsbad MWD	None	0	0
Del Mar, City of	None	0	0
Escondido, City of	Harvest Hills (formerly Safari Highlands)	694	694
Fallbrook PUD	None	0	0
Helix WD	None	0	0
Lakeside WD	Yerba Valley Annexation	5	5
Oceanside, City of	None	0	0
Olivenhain MWD	None	0	0
Otay WD	Otay Ranch Village 13	1,318	1,318
	Peaceful Valley Ranch	70	70
	Stoddard Parcel	2	2
	San Ysidro Mt. Parcel Village 17 (296 Sfd)	148	148
	Annexations East Of Village 13	250	250
Padre Dam MWD	Viejas	2,307	2,307
	I-8 corridor near Viejas Boundary	81	81
Poway, City of	None	0	0
Rainbow MWD	Warner Ranch	519	519
	Warner Ranch/Sycamore Ranch	151	151
Ramona MWD	None	0	0
Rincon Del Diablo MWD	Homes between Del Dios Hwy and Lake Hodges	0	417
	Sringeri Vidya Bharati Foundation Temple	12	12
	Sringeri Vidya Bharati Foundation Temple Ancillary Facilities	12	12
San Diego, City of	Nakano Development	15	15
San Dieguito WD	None	0	0
Santa Fe ID	None	0	0
Sweetwater Authority	None	0	0
Vallecitos WD	None	0	0
Valley Center MWD	Lake Wohlford Resort	32	135
Vista ID	None	0	0
Yuima MWD	Pauma Valley Water Company	40	40
	Shadow Run	15	15
	Rancho Corrido	17	17
Total Potential Annexations		5,688	6,208

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Appendix L: DWR's Standardized Tables

**(To be Included in Future Version of 2020 UWMP once DWR
Releases Final Standardized Tables)**

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