2025

URBAN WATER MANAGEMENT PLAN

JUNE 2026

San Diego County Water Authority



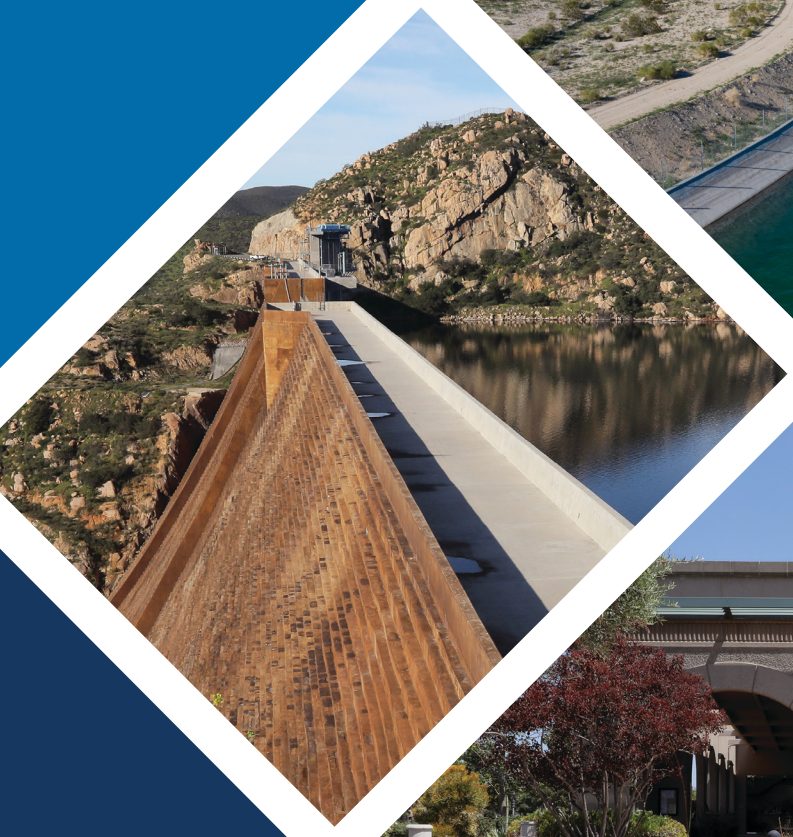






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Acronyms

AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
AWE	Alliance for Water Efficiency
AWP	Advanced Water Purification
BDCP	Bay-Delta Conservation Plan
CCR	California Code of Regulations
CEC	California Energy Commission
CECs	constituents of emerging concern
cfs	cubic feet per second
CII	commercial, industrial, and institutional
CIMIS	California Irrigation Management Information System
CIP	Capital Improvement Program
CLCA	California Landscape Contractors Association
CMIP	Coupled Model Intercomparison Project
CMIP6	CMIP Phase 6
CNRA	California Natural Resources Agency
CO2e	carbon dioxide equivalent
COPR	California Office of Planning and Research
CRA	Colorado River Aqueduct
CRBSC	Colorado River Basin Salinity Control
CSP	Carryover Storage Project
CSPG	Carryover Storage Policy Guidelines
CVP	Central Valley Project
CVWD	Coachella Valley Water District
CW3E	Center for Western Weather and Water Extremes
CWA	County Water Authority
CWSRF	Clean Water State Revolving Fund
DAC	Disadvantaged Communities
DBP	disinfection byproducts
DCP	Drought Contingency Plan

DDW	Division of Drinking Water
DEHQ	Department of Environmental Health and Quality
DIM	dedicated irrigation meter
DLR	detection limit for reporting
DMP	Drought Management Plan
DRA	Drought Risk Assessment
DSOD	Division of Safety of Dams
DWA	Desert Water Agency
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EMP	Energy Management Policy
ESA	Energy Savings Assistance
ESP	Emergency Storage Project
ET	evapotranspiration
°F	degrees Fahrenheit
GCM	general circulation model
GHG	greenhouse gas
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
HCP	Habitat Conservation Plan
HFPO-DA	hexafluoropropylene oxide dimer acid
HOA	homeowners association
HVAC	heating, ventilating, and air conditioning
ICS	Incident Command System
ICP	Integrated Contingency Plan
ICS	Intentionally Created Surplus
IID	Imperial Irrigation District
IPR	Indirect Potable Reuse
IRWM	Integrated Regional Water Management
JPA	Joint Powers Authority
km	kilometer

kW	kilowatt
LEAVES	Landscape Efficiency and Value Enhancement Solutions
LEF	landscape efficiency factor
LOCA	Localized Constructed Analog
LRP	Local Resources Program
LWSD	Local Water Supply Development
µg/L	micrograms per liter
mg/L	milligrams per liter
M&I	municipal and industrial
MAAP	Member Agency Administered Program
MAFY	million acre-feet per year
MAIN	Municipal and Industrial Needs
MCB	Marine Corps Base
MCL	maximum contaminant level
MGD	million gallons per day
MOU	memorandum of understanding
MS4	Municipal Separate Storm Sewer System
MT	metric tons
MTBE	methyl tertiary butyl ether
MW	megawatt
MWD	Municipal Water District
MWELO	Model Water Efficient Landscape Ordinance
MWh	megawatt-hours
NCCP	Natural Community Conservation Plan
NDMA	nitrosodimethylamine
NGOs	non-profit organizations
NIST	National Institute of Standards and Technology
NL	notification level
NOM	natural organic matter
NSDWRC	North San Diego Water Reuse Coalition
OEHHA	Office of Environmental Health Hazard Assessment
pCi/L	picocuries per liter
PFBS	perfluorobutane sulfonic acid and its potassium salt

PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PHG	public health goal
PPCP	pharmaceuticals and personal care products
ppt	parts per trillion
PSAWR	Permanent Special Agricultural Water Rate
PSPS	Public Safety Power Shutoffs
PVID	Palo Verde Irrigation District
PVU	Paradox Valley Unit
QSA	Quantification Settlement Agreement
QWEL	Qualified Water Efficient Landscaper
R-GPCD	residential gallons per capita per day
RAC	Regional Advisory Committee
REC	renewable energy credits
RL	response level
RO	reverse osmosis
RSF	rate stabilization fund
RWMG	Regional Water Management Group
RWQCB	Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SB	Senate Bill
SCSC	Southern California Salinity Coalition
SDG&E	San Diego Gas & Electric
SDWA	Safe Drinking Water Act
SGMA	Sustainable Groundwater Management Act
SNMP	salt and nutrient management plan
SSP	socioeconomic pathway
SWP	State Water Project
SWRCB	State Water Resources Control Board
1,2,3-TCP	1,2,3-trichloropropane

TAF	thousands of acre-feet
TDS	total dissolved solids
TOC	total organic carbon
UCMR	Unregulated Contaminant Monitoring Rule
URCs	Underrepresented Communities
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
UWMP	Urban Water Management Plan
UWUO	Urban Water Use Objective
W/m^2	watts per square meter
WAG	Water Affiliates Group
WD	Water District
WELDCP	Water Efficient Landscape Dual Certification Program
WPA	Water Purchase Agreement
WQCP	Water Quality Control Plan
WQIP	Water Quality Improvement Plan
WR	Water Resources
WRA	Water Reliability Assessment
WRAP	Water Reuse Action Plan
WRF	Water Reclamation Facility
WSA	Water Supply Assessment
WSAP	Water Supply Allocation Plan
WSCP	Water Shortage Contingency Plan
WSDRP	Water Shortage and Drought Response Plan
WSS	Water Supply Strategy
WTP	Water Treatment Plant
WUCA	Water Utility Climate Alliance

Terms

AWE Tool	Alliance for Water Efficiency Water Conservation Tracking Tool
Basin Plan	Water Quality Control Plan for the San Diego Basin
Bay-Delta	Sacramento-San Joaquin Bay-Delta
Bay-Delta WQCP	Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary
Board	Water Authority Board of Directors
California WaterFix	2015 version of the BDCP
County	San Diego County
Policy Handbook	Policy Handbook Establishing a Standard Method of Testing and Reporting of Microplastics in Drinking Water
Interim Guidelines	2007 Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead
Metropolitan	Metropolitan Water District of Southern California
Model Drought Ordinance	Model Drought Response Conservation Program Ordinance
Recycled Water Policy	Policy for Water Quality Control for Recycled Water
Settlement Act	San Luis Rey Indian Water Rights Settlement Act
Transfer Agreement	Water Conservation and Transfer Agreement
UWMP Act	Urban Water Management Planning Act
UWMP Guidebook	Urban Water Management Plans Guidebook for Urban Water Suppliers
Water Authority	San Diego County Water Authority
Water Code	California Water Code
WaterSmart	The Water Authority's water-use-efficiency initiative and efforts to promote that brand

Acronyms

AB	Assembly Bill
AF	acre-feet
AFY	acre-feet per year
DRA	Drought Risk Assessment
DWR	Department of Water Resources
IID	Imperial Irrigation District
IRWM	Integrated Regional Water Management
M&I	municipal and industrial
MAFY	million acre-feet per year
QSA	Quantification Settlement Agreement
RWMG	Regional Water Management Group
SANDAG	San Diego Association of Governments
SB	Senate Bill
SWP	State Water Project
TDS	total dissolved solids
TOC	total organic carbon
UWMP	Urban Water Management Plan

Terms

Metropolitan	Metropolitan Water District of Southern California
UWMP Act	Urban Water Management Planning Act
Water Authority	San Diego County Water Authority
Water Code	California Water Code

Executive Summary

The San Diego County Water Authority (Water Authority) has prepared the 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act (UWMP Act). The 2025 UWMP serves as the region's strategic roadmap for securing a safe, reliable, and sustainable water supply amid evolving challenges and changing conditions.

This Executive Summary fulfills the requirements of California Water Code (Water Code) Section 10630.5 by providing a clear, accessible overview of the plan, including the Water Authority's approach to ensuring supply reliability, key challenges facing the region, and strategies being implemented to manage risk and adapt to the future.

ES.1 Introduction

The Water Authority's mission is to ensure a safe, reliable, and sustainable water supply for its 22 member agencies serving communities throughout the San Diego region. As the region's primary water provider, the Water Authority supplies between 75% and 95% of the water used across the county — water that member agencies deliver directly to homes, businesses, and industries.

The 2025 UWMP outlines a diversified portfolio of water resources to meet the region's needs under a range of conditions, including drought. This strategic mix of supplies will help sustain regional growth, support economic vitality, and strengthen resilience in the face of an uncertain climate future.

ES.1.1 Service Area Characteristics

The population within the Water Authority's service area was approximately 3.2 million people in 2025 and is projected to increase slightly to roughly 3.3 million people by 2050. It is expected that an additional 15,000 acres within the Water Authority's service area will be developed between 2022 and 2050, with about three-quarters (11,500 acres) of development dedicated to residential land uses. These regional growth projections are based on the San Diego Association of Governments (SANDAG) Series 15 Regional Growth Forecast (SANDAG, 2024), developed for *The Regional Plan* adopted in December 2025 (SANDAG, 2025).

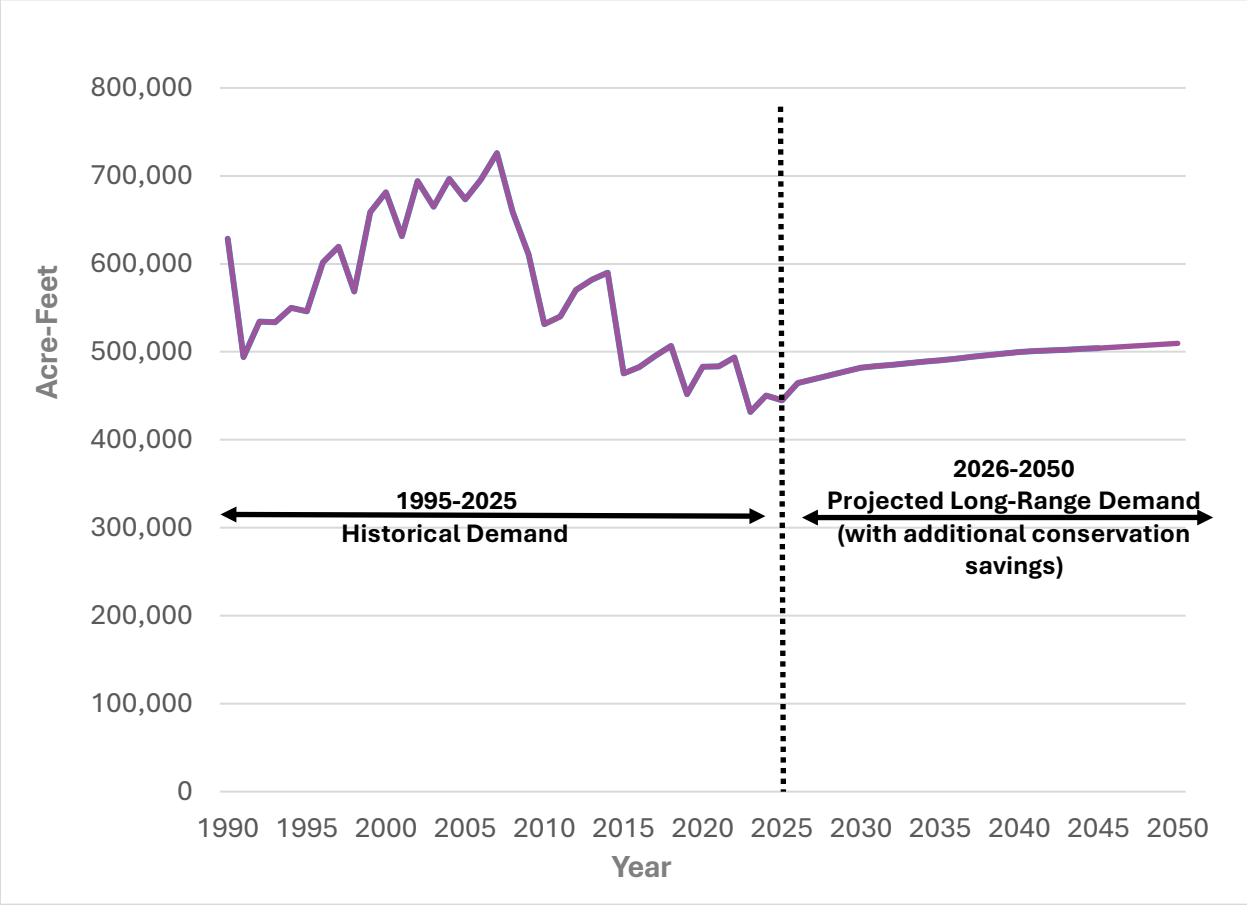
Climate within San Diego County is characteristically Mediterranean along the coast, with mild temperatures year-round. Inland area weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (°F) and winter temperatures occasionally dipping below freezing. Average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

ES.2 Water Demands

In fiscal year 2025, total water demand in the Water Authority's service area was approximately 469,000 acre-feet (AF), of which 94% was for municipal and industrial (M&I) use and 6% was for agricultural use. By 2050, the Water Authority's total water demands are projected to reach 509,759 acre-feet per year (AFY). This projection accounts for planned future water conservation savings and out-of-region exchanges.

By comparison, in fiscal year 2007, water demand in the Water Authority's service area reached a record level of 736,286 AF. The drop in water demand since 2007 is attributable to a combination of factors, including conservation efforts, a growing water use efficiency ethic, detachment of two agencies from the Water Authority service area, 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, including out-of-region exchanges as discussed in Section 2.3.

Figure ES-1 Historical and Projected Normal Water Demands (AFY)



ES.3 Demand Management

Demand management is an important ongoing component of the Water Authority's long-term strategy to build water resilience in the San Diego region. For more than 30 years, the Water Authority and its member agencies have used outreach, education, and incentive programs to achieve conservation and increased water use efficiency. These efforts have resulted in a per-capita water use decrease of more than 50% since 1990 and a reduced need for imported water to meet regional demands. Comparing actual and forecasted water use by urban water suppliers in the region, very little additional conservation will be required to meet new residential water use efficiency targets developed as a result of Assembly Bill (AB) 1668 and Senate Bill (SB) 606 of 2018, also known as the "Making Conservation a California Way of Life" legislation.

The Water Authority has consistently promoted water-use efficiency programs through its communications and outreach channels. These programs are grouped into five categories including turf replacement, audits and surveys, water saving devices, education, and studies & other, and are primarily funded through grants and interagency partnerships, detailed in the 2025 UWMP Chapter 3*, Demand Management*. The Water Authority has also implemented focused outreach efforts to build awareness and public acceptance for water-use efficiency as a desirable lifestyle and a permanent civic responsibility.

ES.4 Water Authority Supplies

More than half of the San Diego region's water supply comes from the Water Authority's imported supply portfolio, which consists of supplies from the Colorado River and from the northern Sierra watershed via the State Water Project (SWP). Historically, the Water Authority purchased its imported supplies solely from the Metropolitan Water District of Southern California (Metropolitan). However, through investments over the last 30 years to ensure supply resiliency, the Water Authority has developed an independent Colorado River supply with high-priority rights that largely insulate the region from shortage impacts.

ES.4.1 Water Authority's Quantification Settlement Agreement Supplies

The San Diego region's independent Colorado River supplies are established under the 2003 Quantification Settlement Agreement (QSA), a historic set of agreements that have enabled California to live within its 4.4 million-AFY (MAFY) apportionment of Colorado River annual apportionment. A cornerstone of the QSA is the conserved water transfer agreement between the Water Authority and the Imperial Irrigation District (IID). Per the terms of the conserved water transfer, the Water Authority funds a conservation program in the Imperial Valley and as a result receives 200,000 AFY through 2047 with the possibility to extend through 2077. Additionally, the Water Authority, together with the state, funded the concrete lining of sections of the All-American and Coachella Canals, conserving water that would have been lost to ground seepage. As a result of that water savings, the Water Authority receives an additional 77,700 AFY through 2112. These supplies serve as a foundation for local supply development by the Water Authority's member agencies.

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 the 2025 UWMP Chapter 9, *Water Supply Reliability*.

ES.5 Member Agencies Supplies

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

Since 1980, between 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. Over the years, an increasing share of local supply has come from recycled water, groundwater recovery, and seawater desalination projects. Additionally, local supplies include water transfers with implementation of the San Luis Rey Water Transfer. In fiscal year 2025, total local water sources provided 33% of the water used in the Water Authority's service area.

ES.6 Metropolitan Water District of Southern California Supplies

As one of the 26 member agencies of Metropolitan, the Water Authority has the ability to purchase water from Metropolitan to help address regional supply gaps. Under Section 135 of the Metropolitan Act, each member agency has a preferential right to purchase Metropolitan water. Metropolitan sources its water primarily from two major systems: the Colorado River and the northern Sierra watershed via the SWP. From the Colorado River, Metropolitan receives 550,000 AFY as part of its basic apportionment, along with additional water supplies secured through various programs. Metropolitan is the largest contractor with the California Department of Water Resources (DWR) for the State Water Project and is entitled to receive up to 1.9 MAFY of water from the Bay-Delta.

To enhance reliability during dry periods, Metropolitan utilizes a range of storage programs designed to balance supply availability across wet and dry cycles in the hydrologic system. These programs help Metropolitan manage fluctuations in water availability and ensure a more stable supply for its member agencies.

ES.7 Water Quality

The Water Authority must protect the quality of the water that passes 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 SWP, are vulnerable to a number of contributors to water quality degradation. High salinity concentrations from total dissolved solids (TDS), uranium, and perchlorate contamination are the primary areas of concern in Colorado River water quality. The key water quality issues for the SWP include excessive

nutrients and disinfection byproduct precursors, in particular total organic carbon, bromide, and low alkalinity.

Regional surface water and groundwater quality is vulnerable to increasing urbanization in the watershed, agricultural runoff, 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. Impaired water supplies result 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 San Diego 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 11 IRWM grants totaling $132.8 million to the San Diego IRWM planning region for high priority water resource management projects.

The Water Authority serves as a regional leader for funding administration, ensuring compliance, reporting, and equitable distribution of grant funding. Looking forward, the IRWM planning efforts are anticipated to evolve into a broader Watershed Resilience Program, aligning with California's climate adaptation strategies and emphasizing integrated, watershed-scale collaboration. Achieving this vision will require sustained funding, policy support, and long-term commitment from regional and state stakeholders.

ES.9 Water Supply Reliability

The 2025 UWMP presents the Water Authority's water reliability assessments for the years 2030 through 2050. Consistent with the UWMP Act requirements, each assessment compares total projected water supply and demand over the next 20 years in five-year increments under the following hydrologic scenarios:

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

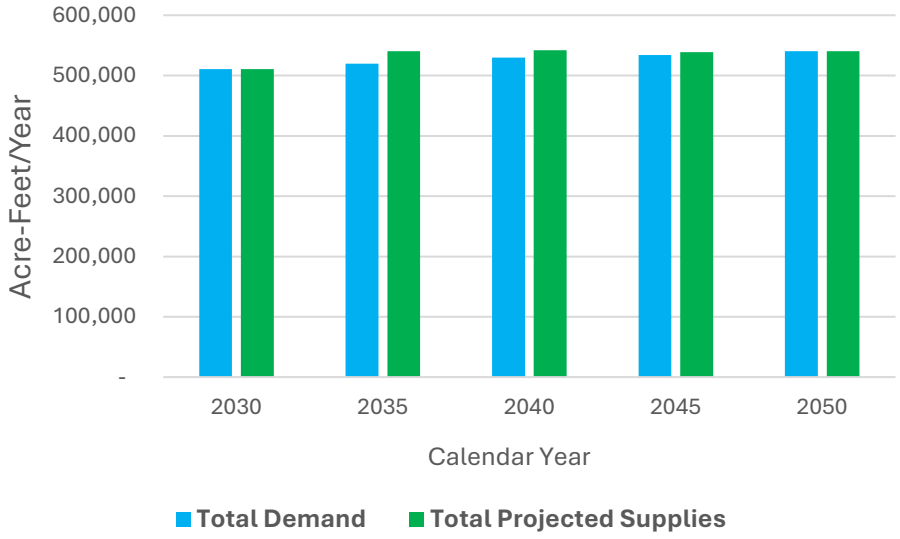
The reliability assessment results demonstrate that, even when making conservative assumptions about the availability of dry-year supplies from Metropolitan, the San Diego region's available water supply is able to meet the Water Authority's projected demands under all conditions and is drought resilient.

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 an average of 2013, 2018, and 2021 single dry-year supplies. Member agencies' 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. Similarly, Water Authority supplies from the IID 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 are maintained and developed supply as planned, and with 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 illustrates total water demand and projected supplies through 2050 under single dry-year conditions, presented in five-year increments.

Figure ES-2 Single Dry-Year Supply and Demand Assessment, 2030-2050 (AFY)[1,2]



[1] Metropolitan supplies included in the projected mix are not representative of the Water Authority's full preferential rights.

[2] Calendar Year 2050 supply assumes the IID Water Transfer and out-of-region exchange agreements are extended. See Section 10.2.4, *Scenario Analysis: Future Potential Scenarios Based on Critical Uncertainties* (Scenario 3) for an analysis representing the IID Water Transfer and exchange agreements ending in 2047.

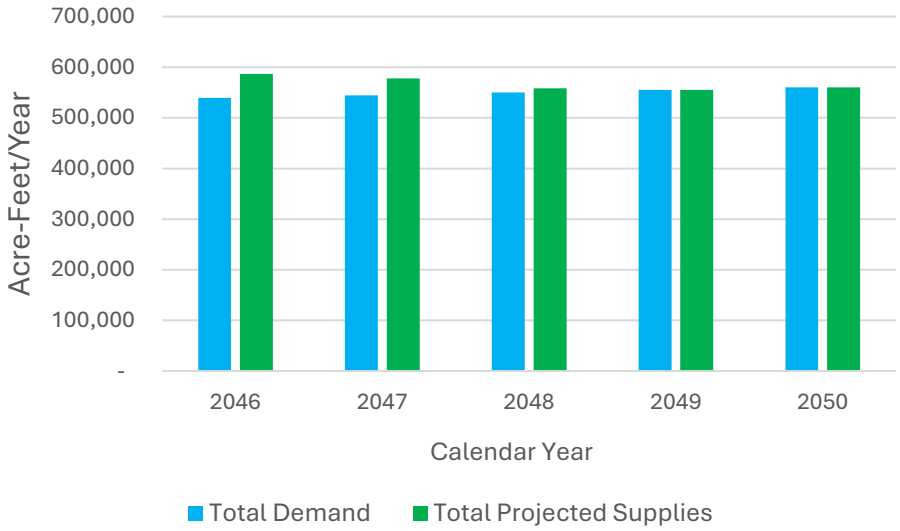
ES.9.2 Multiple Dry-Year Water Supply and Demand Assessment

Under the multiple dry-year scenario, seawater desalination and San Luis Rey water transfer supplies are based on contractual volumes; 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 depicts the multiple dry-year water year assessment for 2046-2050, summarizing total water demands and supplies in the Water Authority's service area through 2050, including out-of-region exchanges, under multiple dry-year conditions. Similar assessments for earlier five-year periods (2030-2045) under multiple dry conditions also show sufficient supplies to meet projected demands.

Figure ES-3 2046–2050 Multiple Dry Water-Year Supply and Demand Assessment (AFY)[1,2]



[1] Metropolitan supplies included in the projected mix are not representative of the Water Authority's full preferential rights.

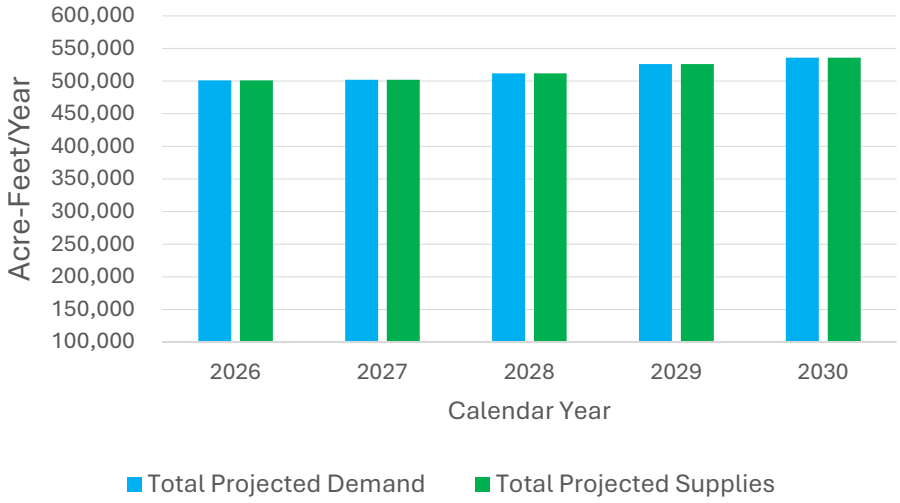
[2] Calendar Year 2050 supply assumes the IID Water Transfer and out-of-region exchange agreements are extended.

ES.9.3 Drought Risk Assessment

The UWMP Act requires inclusion of a Drought Risk Assessment (DRA). The Water Authority's DRA assesses a projected drought over the next five-year period of 2026-2030, as shown in Figure ES-4.

The historical reference period for the driest consecutive years (2014-2018) was used, representing the lowest combined production from local surface and groundwater sources, 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 67,281 AF to a low of 21,137 AF. The demands for 2026-2030 were projected by taking calendar year (CY) 2025 demands of 444,870 AF and escalating them annually for five years based on the multipliers developed to assess the impact of dry/hot weather on water demands. Out-of-region exchanges were subsequently added to the final totals. The multipliers result in a sizable increase in 2026 water demand and incremental increases in demand 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 Drought Risk Assessment, 2026-2030 (AFY)[1]



[1] Metropolitan supplies included in the projected mix are not representative of the Water Authority's full preferential rights.

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, the 2025 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 four 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 with Local Supply Projects Implemented as Planned
2	Drought with Local Supply Projects Delayed
3	Drought Post IID Transfer Agreement Expiration
4	Climate Change

ES.11 Water Shortage and Drought Planning

The 2025 UWMP identifies potential actions the Water Authority could take to address supply shortages due to a catastrophe, drought, or other situations, as discussed in the 2025 UWMP Chapter 11, *Water Shortage Contingency Plan*, which also highlights elements of the Water

Authority's Water Shortage Contingency Plan (WSCP). The WSCP identified actions to be taken in response to various water shortage levels and the process used to perform annual water supply and demand assessments.

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 drought response matrix and response level triggers, the supply allocation methodology, and model drought response ordinance.

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.

The complete WSCP is provided with the 2025 UWMP as Appendix E, *Water Shortage Contingency Plan*.

ES.12 References

San Diego Association of Governments (SANDAG). 2024. Series 15 Regional Growth Forecast, San Diego Water Authority Service Area.

San Diego Association of Governments (SANDAG). 2025. The Regional Plan. December. Available: https://www.sandag.org/regional-plan/-/media/C26FA38C209D483DAC75C9D1E57A2AD1.ashx. Accessed May 2026.

Chapter 1: Introduction and System Description

The San Diego County Water Authority (Water Authority) has prepared this 2025 Urban Water Management Plan (UWMP) in compliance with the Urban Water Management Planning Act (UWMP Act), and California Water Code (Water Code) Sections 10608.36 and 10610 through 10656. This legislation requires urban water suppliers to update their UWMP and submit a complete version to the California Department of Water Resources (DWR) every five years, incorporating applicable water conservation measures, programs, and policies to ensure long-term water supply reliability.

This 2025 UWMP serves as the region's long-term roadmap for securing a safe, reliable, and sustainable water supply over a 25-year planning horizon. Building upon decades of planning and investment, the UWMP outlines strategies to meet future demands, prepare for climate variability, and enhance drought resilience. It reflects the Water Authority's commitment to water use efficiency, supply diversification, and regional collaboration with its 22 member agencies to continue providing reliable water supplies to support the 3.2 million people and businesses across San Diego County (County). Figure 1-1 shows the Water Authority Service Area.

Recent planning updates, including out-of-region exchange agreements, are incorporated into this UWMP through adjustments to projected demands, consistent with the planning approach applied throughout the document. Further details regarding these exchanges are outlined in Chapter 2, *Water Demands*. This 2025 UWMP presents a comprehensive assessment of existing and planned water resources over a 25-year planning horizon and illustrates how a diversified portfolio will support long-term reliability under a range of hydrologic and climate conditions. Since adoption of the 2020 UWMP, the Water Authority and its member agencies have advanced a resilient water supply portfolio by implementing major infrastructure projects and launching new initiatives to adapt to changing conditions. These efforts have led to significant achievements, including the conservation of more than one million acre-feet (AF)[1] of water since 1991, and a 50% reduction in per-capita potable water use between fiscal years 1990 and 2025.

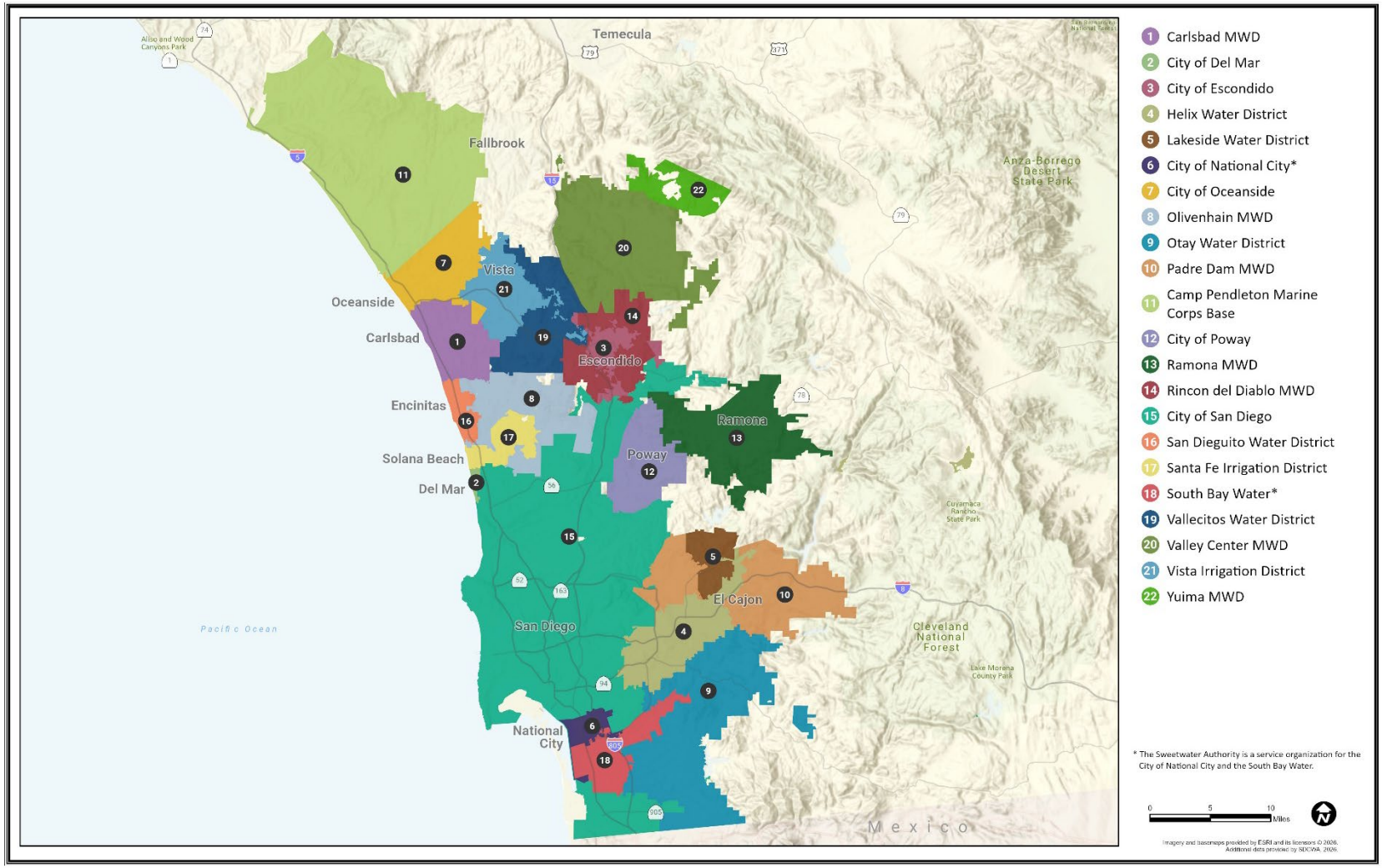
This 2025 UWMP highlights the continued development of local water supplies through recycled water, brackish groundwater recovery, potable reuse, and seawater desalination. These locally driven projects and programs are designed to reduce reliance on imported water and bolster regional drought resilience. Key strategies include expanding potable reuse, increasing recycled water production, and advancing desalination and groundwater recovery, all while maintaining water use efficiency as a cornerstone of long-term water supply reliability for the San Diego region.

1.1 California Urban Water Management Planning Act

The UWMP Act requires all urban water suppliers in California to develop UWMPs and update them every five years to ensure continued alignment with evolving water resource needs and regulatory requirements. There have been no legislative updates or amendments to the UWMP Act since preparation of the Water Authority's 2020 UWMP.

[1] One acre-foot is equivalent to approximately 325,851 gallons, which is enough water to serve two typical families of four for a year.

Figure 1-1 Water Authority Service Area and Member Agencies



The Water Authority used DWR's *2025 Urban Water Management Plans Guidebook for Urban Water Suppliers* (DWR, 2025) during preparation of this 2025 UWMP. Guidance revisions in the 2025 UWMP Guidebook were minimal compared to previous guidance, with updates including California's "Making Conservation a Way of Life" legislation, established by Assembly Bill (AB) 1668 and Senate Bill (SB) 606 of 2018, to require incorporation of Urban Water Use Objectives (UWUOs) into 2025 UWMPs.

Additional regulations not located within the UWMP Act, but which may affect the contents of UWMPs and future updates, include:

- **Bay-Delta Reliance –** California Code of Regulations (CCR), Title 23, Section 5003 requires implementation of Policy Water Resources (WR) P1: Reduce Reliance on the Delta Through Improved Regional Water Reliance in *The Delta Plan* (Delta Stewardship Council, 2013). In the 2025 UWMP Guidebook, DWR recommends any urban water supplier receiving water from the Bay-Delta include voluntary information in their 2025 UWMP to demonstrate compliance with Policy WR P1 (DWR, 2025). Guidance for demonstrating reduced reliance on the Bay-Delta is provided by DWR in its 2025 UWMP Guidebook.
- **UWUOs 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 UWUOs for urban water suppliers and then require annual reporting on compliance with those objectives. The regulation, in CCR Title 23, Section 965 et seq, establishes a framework for calculating a UWUO. Additional discussion of this regulation is provided below in Section 1.2, *Water Conservation Legislation*.

This 2025 UWMP includes Appendix A, *California Water Code Changes*, and describes minor changes related to the 2025 UWMP content and analysis requirements. No changes to the UWMP Act have occurred since preparation of 2020 UWMPs.

1.2 Water Conservation Legislation

In November 2009, the California State Legislature passed SB 7 as part of the Seventh Extraordinary Session (SB 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% reduction goal by 2020.

Over the last decade, conservation requirements have evolved through new legislation, including the following related bills and regulations:

- The "Making Conservation a California Way of Life" legislation established by SB 606 and AB 1668 provided a statewide framework for long-term water conservation and drought resilience planning, including establishment of a framework for calculating UWUOs. SB 606 and AB 1668 are companion measures that link state water-efficiency targets with local water-supply planning to achieve statewide water conservation goals and maintain reliable water supplies. Water Code Section 10609.2, added by AB 1668, directs the SWRCB and DWR to adopt UWUO standards for outdoor residential water use, outdoor landscape irrigation with dedicated meters, and water loss, as well as performance measures for commercial, industrial, and

institutional (CII) water use. The Making Conservation a California Way of Life regulation which assigned each retail supplier a specific water-use target based on efficiency standards for indoor residential water use, outdoor landscape irrigation, and system water loss. Under this legislation, each urban retail water supplier is required to annually calculate its UWUO no later than January 1, 2025, and demonstrate compliance with the objective by January 1, 2027. Water efficiency programs implemented over the years, such as rebate and direct-install initiatives, leak detection sensor deployment, turf removal and landscape transformation programs, and public outreach and education efforts have resulted in most member agencies already complying with their 2027 targets.

For outdoor standards, compliance is based on a landscape efficiency factor (LEF) which indicates the amount of water a supplier needs to deliver to maintain healthy and efficient landscapes. Section 968 sets the residential outdoor water use standard at LEF of 0.80 until June 30, 2035, when it lowers to 0.63, and finally lowers to 0.55 on July 1, 2040. Section 969 sets the CII outdoor water use standard for dedicated irrigation meters (DIMs) at LEF of 0.80 until June 30, 2035, when it lowers to 0.63, and finally lowers to 0.55 on July 1, 2040.

The Water Code requires annual reporting on actual water usage and grants the SWRCB the authority to monitor, verify and take corrective action to remedy violations if a supplier is non-compliant. These laws expand authorities and requirements for urban water suppliers, while maintaining the foundational provisions of SB X7-7.

- SB 1157 amended Water Code Section 10609.4 to set the residential indoor water use standard at 55 gallons per capita per day (GPCD) until January 1, 2025, when it lowers to 47 GPCD, and finally lowers to 42 GPCD on January 1, 2030.
- The “Making Conservation a California Way of Life” regulations, in CCR Title 23, Section 965 et seq, establishes a framework for calculating an UWUO.
- SB 1572 directed conservation of potable water by prohibiting its use to irrigate non-functional turf (NFT), with phased compliance deadlines including public landscapes by January 1, 2027, CII landscapes by January 1, 2028, and homeowners association (HOA) common areas by January 1, 2029.

SB 606 and Assembly Bill (AB) 1668 directed the DWR and the SWRCB to develop and adopt long-term water use efficiency standards designed to exceed the “20x2020” conservation targets. In July 2024, the SWRCB adopted the Making Conservation a California Way of Life regulation which assigned each retail supplier a specific water-use target based on efficiency standards for indoor residential water use, outdoor landscape irrigation, and system water loss. Under this regulation, each urban retail water supplier is required to annually calculate its UWUO no later than January 1, 2025 and demonstrate compliance with the objective by January 1, 2027. Water efficiency programs implemented over the years, such as rebate and direct-install initiatives, leak detection sensor deployment, turf removal and landscape transformation programs, and public outreach and education efforts have resulted in most member agencies already complying with their 2027 targets.

Wholesale water suppliers must include in their 2025 UWMPs an assessment of their present and proposed future measures, programs, and policies to help retail agencies achieve their water use reduction targets (Water Code Section 10608.36). The Water Authority provides support for regulatory compliance through regional programs and outreach. The Water Authority has assisted

its member agencies through the water use efficiency incentive and education programs detailed in Chapter 3, *Demand Management*.

1.3 Senate Bills 610 and 221

Water Code Sections 10910 through 10914 (SB 610) and Government Code Sections 65867.5, 66455.3, and 66473.7 (SB 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.

Chapter 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 member agencies in preparing water supply assessments and written verifications required by state law. Specific documentation about member agency supplies and supplies from the Metropolitan Water District of Southern California (Metropolitan) may be found in their respective UWMPs.

1.4 2025 UWMP Preparation and Public Noticing

The Water Authority used the DWR's 2025 UWMP Guidebook and UWMP Checklist in preparation of this 2025 UWMP (DWR, 2025). DWR developed a checklist to guide water suppliers in meeting all statutory requirements of the UWMP Act. The UWMP Checklist guides agencies in meeting all statutory requirements of the UWMP Act which the Water Authority has completed and is referenced throughout the plan, included as Appendix C.

To adequately demonstrate regional water supply reliability over the next 25 years, this 2025 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 and out-of-region exchanges. While this 2025 UWMP contains comprehensive documentation of the Water Authority's supply portfolio, the UWMPs submitted by each member agency and Metropolitan detail their system-specific supply sources, thereby reinforcing the region's overall supply diversification and reliability. All data presented in this 2025 UWMP are expressed on a calendar year basis, except where otherwise noted.

Ensuring alignment across the UWMPs prepared by Metropolitan, the Water Authority, and its member agencies is critical for the quantification of projected water supplies available to satisfy demand forecasts. To facilitate coordination in the Water Authority's service area, the Water Authority formed a UWMP Working Group comprised 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 UWMP member agency coordination meetings to discuss and share information about demands and supplies within their respective service areas. Throughout 2024 and 2025, the Water Authority participated in DWR webinars to evaluate the requirements of the UWMP Act and the 2025 UWMP

Guidebook. Water Authority staff also served on the 2025 UWMP Guidebook Workgroup, a stakeholder group coordinated by the DWR to review draft guidance and provide technical feedback during development of the 2025 UWMP Guidebook.

An administrative draft of this 2025 UWMP was distributed to member agencies for technical review in January 2026. The analyses presented in this UWMP are based on a validated dataset incorporating updates through February 2026, consistent with the technical review process. Subsequent agreements, including recent out-of-region exchange agreements, are incorporated into the planning framework through adjustments to projected demands, consistent with the analytical approach used in this plan. Providing member agencies with the administrative draft containing supply projections supported regional coordination and consistency across UWMPs. Comments received from member agencies on the administrative draft were incorporated into the public review draft.

The Water Authority encouraged public involvement in its service area prior to and during preparation of the draft 2025 UWMP (Water Code Section 10642). The public review draft 2025 UWMP and WSCP were distributed to the Water Authority Board of Directors (Board) and were made available to the public for review and comment on the Water Authority website (sdcwa.org), for compliance with Water Code Sections 10635(c) and 10645(b). The draft 2025 UWMP was made available for public review on March 12, 2026, with comments due by April 25, 2026.

A public hearing to receive comments on the draft 2025 UWMP was held on April 23, 2026. Notice of the public hearing was published in two separate issues of the *San Diego Union-Tribune*, as required by Government Code Section 6066 and Water Code Section 10642. In accordance with the UWMP Act, the Water Authority notified land use jurisdictions within its service area 60 days prior to Board adoption regarding preparation of this 2025 UWMP (Water Code Section 10635(b)). The Water Authority reviewed all comments received and revised the plan accordingly.

On June 25, 2026, the Board adopted this 2025 UWMP. The Water Authority submitted an electronic copy of the adopted UWMP to DWR, in compliance with the deadline (Water Code Section 10621(d) and Water Code Section 10644(a)(2)). A copy of the adopted 2025 UWMP was submitted to the California State Library, the County, and cities in the Water Authority service area within 30 days of adoption (Water Code Section 10644(a)(1)). The adopted 2025 UWMP is available at the Water Authority office located at 4677 Overland Avenue, San Diego, California, 92123, and is posted on the Water Authority website (Water Code Section 10645). Copies of the resolution adopting this 2025 UWMP, as well as notifications, mailing lists, and other implementation documents are provided in Appendix B, *Water Authority 2025 UWMP Implementation Documents*.

1.5 Water Authority History and Description

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 during World War II. During this time, the federal government also arranged for supplemental water supplies from the Colorado River in response to growing military presence. In 1947, water began to be imported from the Colorado River through a single pipeline connected to Metropolitan's Colorado River Aqueduct (CRA) in Riverside County. To meet water demands of a growing population and economy in the San Diego region, the Water Authority constructed four additional pipelines between the 1950s and early 1980s that are all connected to the Metropolitan distribution system and deliver water to the County. The Water

Authority is now the County's predominant source of water in the San Diego region, supplying from 75 to 95% of supply needs, which depend on weather conditions and yield/production from surface and supplemental water transfer supplies, as well as recycled, groundwater, and desalination projects.

The Water Authority's 22 member agencies purchase wholesale water from the Water Authority for retail distribution in their respective service areas. Governance of the Water Authority is comprised of a 34-member Board representing those member agencies and is currently represented by six cities, five water districts, seven municipal water districts, three irrigation districts, and one federal military reservation. The Board is responsible for establishing and implementing Water Authority plans and policies and holds regular monthly meetings and special workshops open to the public to provide comments on agenda items.

1.6 Physical Water Delivery System

This section describes the infrastructure and facilities used to deliver, store, and treat water across the Water Authority service area, which supplies imported water for wholesale distribution to Water Authority member agencies. Each subsection provides an overview of the aqueducts, pipelines, pump stations, reservoirs, treatment facilities, renewable energy systems, and capital improvement planning efforts that support the water delivery system.

Imported water conveyed through this infrastructure and facilities includes water purchases from Metropolitan, water transfers from the Imperial Irrigation District (IID), canal lining projects, and water transfers 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)*. 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 other potable water supplies for regional distribution.

1.6.1 Aqueduct System

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 (First Aqueduct and Second Aqueduct), both of which originate at Lake Skinner in southern Riverside County and run from north to south through the Water Authority service area (Figure 1-1). Metropolitan's ownership of these pipelines extends to a "delivery point" six miles into the County.

First Aqueduct: Composed of Pipelines 1 and 2, which reach 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.

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

- Pipeline 3 provides 280 cfs

- Pipeline 4 provides 450 cfs
- Pipeline 5 provides 500 cfs

In addition to the pipelines that form the First Aqueduct and Second Aqueduct described above, additional pipelines extend water service to multiple member agencies from east to west. Table 1-1 lists the pipelines owned and operated by the Water Authority.

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	58.2	66–75
Pipeline 4	43.9	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
Total:	**306.8**	

Although most water is conveyed by gravity in the aqueduct system, the Water Authority also maintains several pump 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	n/a[a]
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

cfs = cubic feet per second; ESP = Emergency Storage Project

[a] Provides a hydraulic boost during elevated flows on the Crossover Pipeline.

The Water Authority maintains pump stations for untreated water sized to protect the region from potential disruptions of imported water supplies under the Emergency Storage Project (ESP). If a supply disruption occurs, the untreated water pump stations will deliver emergency water supplies from storage reservoirs.

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 consist of enclosed reinforced concrete storage tanks and are available to manage the daily balance of treated and untreated water deliveries. System Regulatory Storage in the aqueduct system currently totals 63 million gallons, with most of this capacity 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, and 157,663 AF at the San Vicente Reservoir. 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 Twin Oaks Valley WTP with treatment capacity of 100 million gallons per day (MGD) and has agreements with Helix Water District for 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. In addition, the Water Authority purchases desalinated ocean water produced at the Carlsbad Desalination Plant, which can provide up to 54 MGD of treated water delivered to the Water Authority's regional aqueduct system. The balance of treated water supplies comes from Metropolitan's Robert A. Skinner WTP and WTPs owned and operated by Water Authority member agencies. Table 1-3 lists all service area WTPs.

Table 1-3 Service Area Water Treatment Plant Capacity

Member Agency	WTP	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
Oceanside, City of	Mission Basin	6.4
Poway, City of	Berglund	24
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
Sweetwater Authority	Reynold's Desalination	10
Total Service Area Treatment Plant Capacity		**822**

WD = Water District; WTP = Water Treatment Plant; MGD = millions of gallons per day

1.6.4 Capital Improvement Program

In 1989, the Water Authority Board adopted *The Water Distribution Plan: A Capital Improvement Program through the Year 2010*, which served as the foundational planning document for the development and implementation of the Water Authority's Capital Improvement Program (CIP). This plan established a strategic framework for long-term infrastructure investments to enhance regional water distribution and reliability. Since the 1989 document, the Water Authority has revised its CIP every two years as part of the biennial budget setting process.

The current CIP was developed through a structured planning process, which aligns with the Water Authority long-term infrastructure goals and regional water reliability objectives. This process includes review of results from the Asset Management Program, member agency requests, regulatory requirements, and the *2024 Water Facilities Master Plan* (Water Authority, 2024a). The most recent CIP portfolio is outlined in the *General Manager's Adopted Multi-Year Budget for Fiscal Years 2026 and 2027*, which includes 25 active projects with a total estimated value of $1.18 billion (Water Authority, 2025b). These projects are designed to meet projected water supply and delivery needs of the Water Authority member agencies through 2045, and are grouped into the following categories:

- **Asset Management** — The Water Authority 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.

- **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–Valley Center/Yuima Pump Station, ESP–Post Construction Activities, ESP–Owner Controlled Insurance Program Closeout, and other ESP Agreement Obligations.
- **Environmental Mitigation** — The Mitigation Program provides comprehensive mitigation for Water Authority programs, projects, and actions resulting from compliance with the Water Authority's Natural Community Conservation Plan/Habitat Conservation Plan (NCCP/HCP) and state and federal wetland regulations. Short-term efforts focus on coordinated permitting and immediate project needs. Long-term efforts include implementing mitigation projects associated with the Water Authority long-term (50-year) NCCP/HCP commitments and wetland regulatory permit requirements.
- **Planning and Studies** — These are near-term projects identified in the Water Authority's *2024 Water Facilities Master Plan* or through other efforts, focused on the operational resilience of the Water Authority water supply system:
  - *Creek Crossing Vulnerability Assessment Study* to evaluate erosion risks at aqueduct creek crossings and develop a prioritization matrix to mitigate potential pipeline failures due to scour.
  - *Source Water Quality and Localized Nitrification Mitigation Study* to develop a hydraulic model and water quality analysis to simulate system operations, assess water age and source blends, and identify mitigation strategies for nitrification risks.
  - *Twin Oaks Valley Water Treatment Plant Study* to assess future utilization, functions, and cost considerations to inform future facility operations.
- **Regional Resiliency** — These projects focus on stabilizing water rates and providing energy resiliency to critical facilities, ensuring they remain operational during Public Safety Power Shutoffs (PSPS) by San Diego Gas & Electric (SDG&E). By reducing service disruptions, minimizing emergency response costs, and enhancing operational efficiency, these investments help moderate long-term cost volatility and support more predictable water rates.

1.6.5 Renewable Energy Resources

The Water Authority seeks opportunities to reduce costs and generate revenue through development of renewable energy resources. This includes investments to improve operational efficiencies, reduce greenhouse gas (GHG) emissions, and decrease energy consumption. In November 2023, the Board adopted an updated Energy Management Policy (EMP) focusing on the following objectives:

- Revenue generation and energy cost reduction
- Energy resilience
- Collaborative relationships
- Government relations

The EMP establishes a framework to implement energy resilience improvements and evaluate revenue generation sources and energy cost reduction measures to help stabilize water rates. This policy, in conjunction with the Water Authority's *Climate Action Plan* (Water Authority, 2024b), will also provide environmental benefits to the region by helping to reduce GHG emissions associated with energy.

Hydroelectric Facilities

The 4.2-megawatt (MW) Rancho Peñasquitos Hydroelectric and Pressure Control Facility generates up to 18,000 MW-hours (MWh) of clean energy and renewable energy credits (RECs) annually. The energy and RECs produced are currently used to offset retail electricity purchases and renewable portfolio standard obligations for the Carlsbad Desalination Plant. This energy has the potential to reduce GHG emissions by 5,415 metric tons (MT) of carbon dioxide equivalent (CO2e).

Solar Facilities

The Water Authority maintains three solar facilities, built in 2011, within its service area to help offset energy usage. The solar facilities are located at the following sites:

- Twin Oaks Valley WTP (1,114 kilowatts [kW])
- Kearny Mesa Headquarters (454 kW)
- Escondido Operations Center (212 kW)

These solar facilities produce a combined average of 2,320 megawatt-hours (MWh) of electricity annually, accounting for 59% of the energy needs at the Kearny Mesa Headquarters, 38 % of the energy needs at the Escondido Operations Center, and 32% of energy needs at the Twin Oaks Valley WTP. Solar facilities at all three locations were installed by CleanCapital at no cost to the Water Authority through a 20-year contract. CleanCapital owns and operates the systems and sells the energy to the Water Authority at a fixed rate with an annual price escalation factor. Energy generated by these solar facilities reduce Water Authority energy costs, making agency operations more efficient for ratepayers.

In 2024, the Water Authority purchased a new Operations and Maintenance Facility. With this purchase, the Escondido Operations Center will be sold once vacated, and the solar facilities are anticipated to be transferred with the sale. The Water Authority plans to add solar facilities to the Operations and Maintenance Facility and has the potential for 276 kW of solar energy production. These opportunities will be further investigated as part of the Operations and Maintenance Facility development.

1.7 Service Area Characteristics

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

Approximately 44% of the County of San Diego, by area, remains developed with urban uses, the majority of which is located in the coastal urbanized region within the Water Authority service area. An additional 2% of the County is vacant but could be developed, while the remaining 54% of the

County is either dedicated parks and open space, or considered "constrained," meaning there are no opportunities for development due to geography or protected status[2] (SANDAG, 2024). Within the Water Authority service area, residential land uses accounted for approximately 33% of developed land in 2022, and although an additional 15,000 acres of land is anticipated to be developed through 2050, the percentage of residential development is expected to remain steady (SANDAG, 2024). This reflects regional planning priorities to accommodate growth more compactly.

About 8% of the developed area within San Diego County was characterized by agricultural uses in 2022, which are expected to decrease slightly to approximately 7% of the County in 2050 (SANDAG, 2024). Although the total area of agricultural lands under production is in decline, the region maintains a significant number of high-value crops, such as cut flowers, ornamental trees and shrubs, nursery plants, avocados, and citrus. As reported in San Diego County's Food Vision 2030, which updated the County's 2019 *State of the Food System in the San Diego Region*, the region has over 5,000 farms, more than any other county in the nation (SDFSA, 2021). Agricultural sales in San Diego County are about $1.8 billion per year, with a total economic impact estimated at approximately $4.8 billion per year (SDFSA, 2021). Agriculture supports tens of thousands of jobs across farming, distribution, and related industries. San Diego County consistently ranks among the top 10 agricultural counties in California by value of production (SDFSA, 2021).

1.7.1 Regional Economy and Demographics

As one of California's major economic centers, the San Diego region maintains a diverse economy built on four main sectors of military defense operations, life science research, tourism, and technology. In 2024, the metropolitan area reached a gross regional product of $267 billion, surpassing pre-pandemic levels by about 12.8%, reflecting the region's economic adaptability (U.S. Bureau of Economic Analysis, 2026).

Military defense operations is a cornerstone of the County economy contributing approximately $61.3 billion, representing nearly 25% of San Diego's total gross regional product (SDMAC, 2024). This reflects a 17% increase from 2020, underscoring the sector's continued growth. Over 109,000 active-duty service members live in the County, with nearly 357,000 jobs tied to defense spending, providing a large and stable economic source (SDMAC, 2025).

In 2025, the life sciences research sector directly employed 71,448 workers and contributed $54.1 billion to the local economy (Biocom California, 2025). The region continues to benefit life science research institutions such as University of California San Diego, Scripps Research, Salk Institute, and Sanford Burnham Prebys Medical Discovery Institute. In 2023, these institutions collectively secured approximately $2.2 billion in National Institute of Health grants, fueling research in the region. The region continues to receive significant federal investment, with U.C. San Diego alone reporting over $1.7 billion in total research awards for 2024.

Following the pandemic, the San Diego region's tourism sector has shown strong signs of recovery. San Diego's desirable climate, beaches, and attractions continue to draw visitors, supporting thousands of jobs in hospitality, food service, and retail. In 2025, 32.5 million visitors contributed

[2] "Protected status" refers to areas that are legally or institutionally set aside in ways that prevent or severely limit urban development, such as species and habitat protection plans; local, regional, and state parks; National Forests and federal land; geographic constraints such as steep slopes, floodplains, or features otherwise unsuitable for development.

$14.8 billion in direct spending. (San Diego Tourism Authority, 2025). Tourism supports approximately one in eight jobs in the region.

As of 2025, 45.2% of San Diego County residents aged 25 and older held a bachelor's degree or higher, compared to the national average of 38.3% (U.S. Census Bureau, 2025). This reflects a continued increase in educational attainment across the region. In the housing sector, the median sale price of a home in San Diego was $899,000 in February 2026, representing a 0.11% decrease from February 2025. During the same period, the number of homes sold rose from 1,651 to 1,740 units (Redfin, 2026). These figures indicate ongoing activity in the residential real estate market, with moderate year-over-year growth in both pricing and transaction volume.

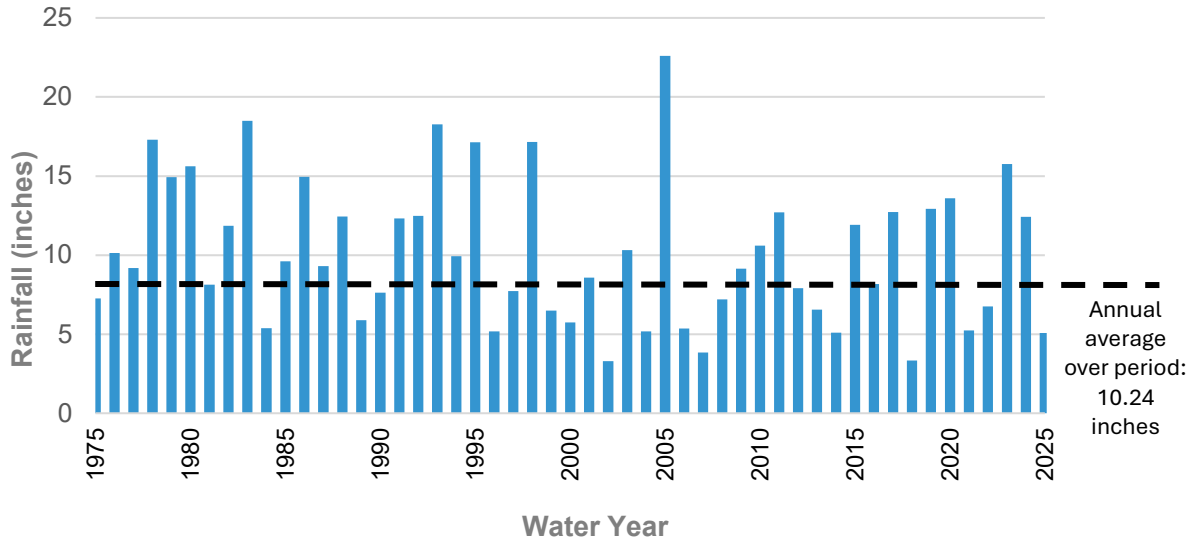
Median household income in San Diego County increased to $109,132 in 2024. Median household income is 30% above the national average of $83,730 (U.S. Census Bureau, 2025). The unemployment rate is 4.4% as of December 2025, which is lower than California's statewide average of 5.5%. In 2025, San Diego County added approximately 8,800 nonfarm jobs over the year. This expansion was led by Private Education and Health Services, which added 12,500 positions, and the Government sectors, which grew by 8,000. These job increases are partially offset by losses in manufacturing and professional and business services sectors (California Employment Development Department, 2026).

1.7.2 Climate

Climate within San Diego County varies between three different regional areas which include coastal, inland, and mountains. In coastal areas, climate is characteristically Mediterranean, with mild temperatures year-round. Inland weather patterns are more extreme, with summer temperatures often exceeding 90 degrees Fahrenheit (°F) and winter temperatures occasionally dipping below 32°F. Average annual rainfall is approximately 10 inches per year in coastal areas and over 33 inches per year for mountain areas. 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 the last multi-year drought from water years 2021 – 2022, the County region experienced above-average rainfall in water years 2023 and 2024 (Figure 1-2). San Diego coastal area received 161% and 127% of average annual rainfall, respectively. Above-average temperatures and prolonged heat waves in the summer months have become the new normal throughout California. The state experienced the hottest meteorological summer (June 1 – August 31) on record, and July 2024 was the hottest month ever recorded (NOAA, 2024).

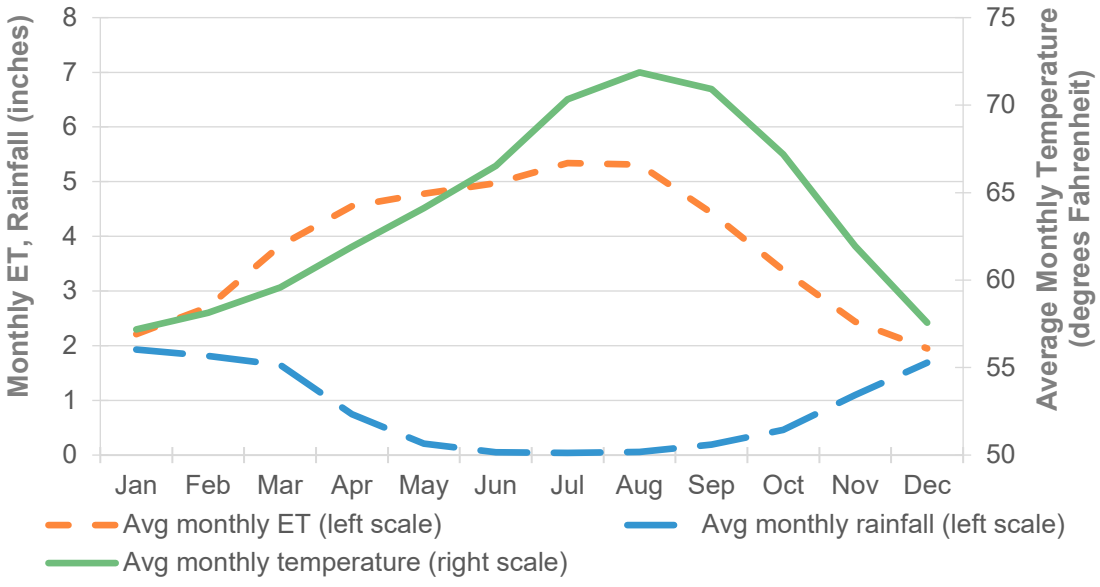
Figure 1-2 Lindbergh Field Annual Rainfall, Water Years 1975 to 2025



Source: National Weather Service

Average monthly rainfall, temperatures and evapotranspiration (ET) for Lindbergh Field, San Diego's municipal airport located in the coastal area, 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 Lindberg 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 Mitigation

This section provides an overview of the Water Authority studies and research on climate change, as well as GHG mitigation measures. The scenario planning process outlined in Chapter 10*,* *Scenario Planning – Managing an Uncertain Future*, addresses potential supply and demand impacts associated with the effects 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. Climate models project with confidence that the region's temperatures will continue to rise, increasing by approximately 4°F by mid-century (2041-2070) compared to the historical period (1981-2010), based on the *San Diego Region Report* of California's Fourth Climate Change Assessment (State of California, 2019); the Fifth Climate Change Assessment is currently being prepared.[3]

Climate change may impact 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 (San Diego RWMG, 2019). The Water Authority recognizes the importance of adapting to climate change and is a leader in sustainability and natural resource stewardship. The Water Authority's *2026-2030 Business Plan* contains climate change management strategies in the Sustainability Program Focus Area (Water Authority, 2025a); the following climate change management strategies were identified therein:

- Identify cost-effective opportunities that mitigate GHG emissions in compliance with emission targets contained in the Climate Action Plan.
- Support climate science research and evaluate opportunities to mainstream adaptation strategies into business practices.
- Ensure resiliency of infrastructure and supplies to adapt to climate change impacts.

Climate Change Workgroups

The Water Authority participates in various research groups which provide opportunities for knowledge sharing and informs future projects, which support adopted plans and policies.

Water Utility Climate Alliance

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, comprised 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 to help meet priorities outlined in its strategic plan. The WUCA list for 2026 includes the following projects:

- Integrating Climate Resilience into Water Utility Planning and Design Processes
- Leveraging Climate Modeling to Produce Future Precipitation Intensity-Duration-Frequency Curves – Phase 2

[3] Updates on California's Fifth Climate Change Assessment are provided online (https://lci.ca.gov/climate/icarp/climate-assessment/) and are anticipated to include an updated report for the San Diego region in 2026.

- Development of WUCA's 2027-2031 Strategic Plan
- Quantifying, Characterizing & Effectively Communicating Issues and Impacts of Climate Initiatives

In addition, WUCA has established several sub-committees (Climate Finance Risk, Climate Equity, Water Demand Forecasting, and Tools & Technologies) to foster discussion and information sharing between WUCA agencies.

Center for Western Weather and Water Extremes Water Affiliates Group

The Water Authority is 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.

Ongoing Research

The Water Authority partners 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.

San Diego Basin Study

The Water Authority partnered with the City of San Diego and the Bureau of Reclamation (USBR) on a San Diego Basin Study to examine supply-side climate change impacts (USBR, 2021). The 2021 *San Diego Basin Study Final Report* 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.

Water Authority Plans 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 successful conservation efforts, increased renewable energy supplied from purchased electricity, and implementing GHG-reducing measures, the Water Authority can meet or exceed its reduction targets for 2030 and 2045 and will continue to reduce its emissions well into the foreseeable future (Water Authority, 2025). To date, these programs and policies have focused on the following:

- Updating of the Water Authority's Climate Action Plan in 2025
- Continuing water supply/energy relationships and implementing mitigation measures to reduce GHG emissions, including energy conservation opportunities, pump upgrades, solar photovoltaic installation, and in-line hydropower generation
- Participating in the Climate Registry: the Water Authority developed its GHG inventory for calendar years 2019 through 2024 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 complying with the State's fleet electrification requirements
- Generating solar power at three Water Authority sites, Twin Oaks Valley WTP, Escondido Operations Center, and San Diego Headquarters, cumulatively generating an estimated 2.5 million kilowatt-hours of energy each year

Climate Action Plan

The Water Authority updated the *Climate Action Plan* in 2025 to track the Water Authority's carbon footprint, estimate future GHG emissions, document progress on GHG reduction measures, identify future GHG reduction opportunities, and highlight monitoring and reporting protocols on GHGs. The following additional opportunities for reducing GHG emissions within its operations were identified:

- GHG reduction opportunities in the Water Authority's Capital Improvement Program planned projects
- Energy Conservation Opportunities identified in the 2020 Energy Audit
- Replacing vehicles and off-road equipment with electric to comply with the State's fleet electrification requirements
- Additional solar installation opportunities

Energy Management Policy

The 2023 Energy Management Policy was developed to support the Water Authority mission to provide guidelines to build a robust energy program, which minimizes energy costs and uses existing and new infrastructure to generate revenues to offset water rates. This policy, in conjunction with the *Climate Action Plan*, will provide environmental benefits to the region by helping to reduce GHG emissions associated with energy and is updated biennially. The 2023 Energy Management Policy objectives focus on four areas:

1. Evaluate economically and operationally sound opportunities to generate revenue and reduce energy costs
2. Improve water system energy resilience to maintain reliability during energy supply disruptions
3. Cultivate collaborative relationships with compatible federal, State, and local agencies or private organizations to maximize energy program benefits
4. Support government relations energy goals as outlined in the current Legislative Policy Guidelines and Federal Legislative Priorities

1.7.4 Population

The Water Authority was established in 1944, which had an estimated population within its service area of 260,000. As of 2025, the population in the Water Authority service area is about 3.2 million and is projected to reach 3.3 million by 2050 (see Table 1-4). Among member agencies, the City of San Diego has the largest population, estimated at 1.4 million in 2025, while Yuima Municipal Water District has the smallest, with an estimated population of 2,000. These projections are

based on the San Diego Association of Government (SANDAG)'s Series 15 Regional Growth Forecast, developed for the 2025 Regional Plan (SANDAG, 2025).

Table 1-4 Water Authority Service Area Population Forecast (2030–2050)

Year	Population
2030	3,207,802
2035	3,264,258
2040	3,293,723
2045	3,279,039
2050	3,264,357
Source: SANDAG, 2024	

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Chapter 2: Water Demands

In-region demand for water in the Water Authority service area falls into two classes of service: municipal and industrial (M&I) and agricultural. In fiscal year 2025, total water demand was approximately 469,300 AF, of which 94% was for M&I use and 6% was for agricultural use. This chapter describes these classes of service along with the total historical, current, and projected water demands. It also includes out-of-region demands established through exchange agreements supported by the 2025 settlement agreement between the Water Authority and Metropolitan. By 2050, total normal water demands are projected to reach 509,759 AF, including future conservation and demand associated with projected near-term annexations.

2.1 Municipal and Industrial Water Demand

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 encompasses both indoor and outdoor uses. Indoor water uses include sanitation, bathing, laundry, cooking, and drinking. Most outdoor water use is attributed to landscape irrigation, with other minor outdoor uses including car washing, surface cleaning, and similar activities. For single-family homes, outdoor demands account for approximately 40% to 60% of total residential use.

The estimated composition of housing stock in the San Diego region was approximately 58% single-family homes, 39% multi-family homes, and 3% mobile homes in 2025 (SANDAG, 2024). Single-family residences generally contain larger landscaped areas thereby requiring more water for outdoor application in comparison to other types of housing. Multi-family and mobile homes generally have less outdoor landscaping and use less water, although some 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 United States Bureau of Labor Statistics indicate that approximately 690,000 of San Diego residents are employed in commercial (trade, transportation, and utilities; professional and business services; and leisure and hospitality) industries (United States Bureau of Labor Statistics, 2025).

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 San Diego region, such as electronics manufacturing and aerospace manufacturing, typically require smaller amounts of water compared to other water-intensive industries in Southern California, such as petroleum refineries, smelters, chemical processors, and canneries.

Tourism affects water use in the Water Authority service area not only through the 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 regional population forecasts do not specifically account for tourism, but is reflected in the economic forecasts and affects water use per capita.

2.2 Agricultural Water Demand

With a moderate climate and virtually frost-free coastal and inland valley areas, San Diego 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 supported significant growth in agriculture. Due to regional development and rising costs, agricultural activities in the Water Authority service area are now primarily concentrated in Northern San Diego County, mainly in the following member agency service areas:

- City of Escondido
- Ramona Municipal Water District
- Valley Center Municipal Water District
- Yuima Municipal Water District

The primary crops grown for local, national, and international markets include avocados, citrus, cut flowers, vegetables, vine crops, and nursery products. The 2024 San Diego County annual crop report identified 207,300 acres to commercial agriculture operations (County of San Diego, 2024).

Total agricultural water demand is the total water use required under the agriculture customer class. This includes agricultural water use in the Water Authority's Permanent Special Agricultural Water Rate (PSAWR) program and agricultural water use that pays a full-service water rate. Although total agricultural demand comprises less than 5% of Water Authority total customer water demand on average (fiscal years 2022-2025), the agriculture sector represents a multi-billion-dollar industry that is highly sensitive to many factors, including weather variabilities and cost of water supply provided by member agencies.

Between 2008 and April 2011, member agency customers voluntarily receiving agricultural water rates 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 mandatory supply allocations that resulted from drought conditions and judicial restrictions on State Water Project (SWP) supply availability, growers implemented various actions including tree stumping and plant stock reduction. As a result, agricultural demand dropped from 98,262 AFY in fiscal year 2007 to 31,690 AFY in fiscal year 2016, a 68% reduction in agricultural demand. This reduced agricultural demand has continued, with agricultural water use in the Water Authority agricultural program averaging roughly 16,400 AFY over fiscal years 2022-2025, excluding agricultural program water use from two agencies that detached from the Water Authority in 2024.

2.3 Out-Of-Region Exchanges

Out-of-region exchanges represent a new demand category for the Water Authority made available through a settlement agreement executed by the Water Authority and Metropolitan in 2025, which established the ability for the Water Authority to deliver conserved Quantification Settlement Agreement (QSA) supplies to Metropolitan and its member agencies. In early 2026, the Water Authority executed water delivery exchange agreements with Eastern Municipal Water District and Western Municipal Water District to help manage long-term costs and regional reliability. These long-term contracts commit the Water Authority to deliver a total of 20,000 AF of its conserved QSA water annually to these two agencies for a period of 21 years.

Additionally, in February of 2026, the Board approved the Water Authority entering into a memorandum of understanding (MOU) that would establish a landmark interstate water exchange pilot program. The USBR, Metropolitan, and neighboring states' agencies are all anticipated to be parties to the MOU which would allow for future transfers or exchanges that leverage the region's successful local water supply development efforts.

2.4 Total Current and Historical Water Use

Water use in the San Diego region is closely linked to 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 state-mandated emergency water regulations culminated in a significant multi-year decrease in total water demand. In fiscal year 2007, water demand in the Water Authority service area reached a record level of approximately 736,286 AFY before decreasing 36% to 469,317 AFY in fiscal year 2025, a reduction of approximately 267,000 AFY. Despite experiencing consistent above-average monthly maximum temperatures for the last several years, this decrease in water demand is attributable to a combination of factors, including above-average rainfall in four of the last seven years, continuing conservation efforts, growing water use efficiency ethics, detachment of two agencies from the Water Authority service area and consumer price response to the retail cost of water. Table 2-1 shows the historical water demand within the Water Authority service area.

Table 2-1 Historical Water Demand within Water Authority Service Area (2005–2025)

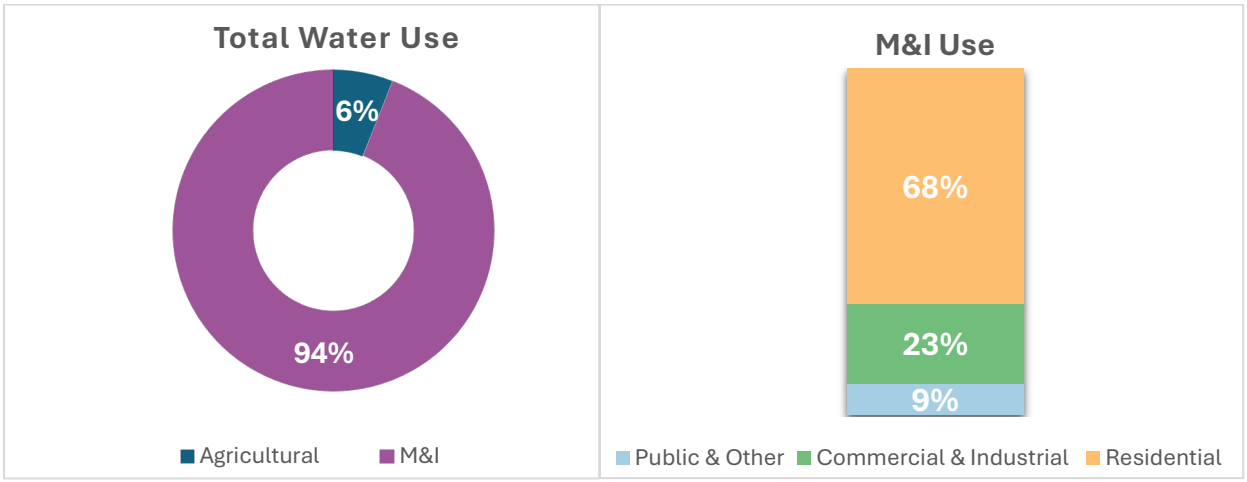
Fiscal Year [a]	Water Use (AF)
2005	645,215
2006	686,549
2007	736,286
2008	690,850
2009	642,803
2010	566,813
2011	533,550
2012	551,466

Fiscal Year [a]	Water Use (AF)
2013	584,052
2014	603,170
2015	538,830
2016	454,877
2017	477,528
2018	519,385
2019	464,233
2020	463,487
2021	503,774
2022	492,983
2023	443,983
2024	436,095
2025	469,312

Source: Water Authority data archival system
[a] 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 service area for fiscal year 2025. In this figure, residential demand includes single-family residential and multi-family residential.

Figure 2-1 Estimated Type of Water Use Fiscal Year 2025



2.5 Projected Water Demands

The Water Authority uses a statistical modeling approach to develop a long-range demand forecast. For the M&I class, the 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 County Water Authority (CWA)-MAIN, was customized to reflect the unique parameters in the San Diego region. Through a set of econometric equations, the CWA-MAIN model relates historical water demand patterns to variables such as household income, consumer response to 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 Cal-Adapt. A Memorandum of Agreement between the Water Authority and SANDAG was established in 1992 to project consumptive water demands for the San Diego region, including the Water Authority and its member agencies. The SANDAG growth forecast is based on general plans and policies of local land use jurisdictions to ensure coordination between local jurisdictions' general plan-based development and the Water Authority projected water demands.

Demographic and economic projections from the SANDAG Series 15 Regional Growth Forecast developed for the 2025 Regional Plan were used for baseline demand forecast updates. Series 15 contains the most recent population, housing, and employment projections using 2022 as base year and projects through 2050. Compared to Series 14, which used 2016 base year, Series 15 reflects a smaller regional population due to pandemic-related losses and reports a slower long-term growth trajectory. This population decrease is driven by a combination of declining natural growth (births minus deaths) and fluctuating net migration. Despite lower population projections, housing demand remains strong, driven by an aging population and smaller household sizes. Increased housing demand relative to population growth is expected to reduce overcrowding in the San Diego region and aligns with housing trends observed in statewide forecasts.

The agricultural class model equations were developed using data provided by Water Authority member agencies, SANDAG, LandIQ, and San Diego County Department of Agricultural Weights and Measures. Variables used in the agricultural model include irrigated acreage in Water Authority service area, distribution of acreage among primary crop types, price of water, general macroeconomic conditions, and water requirements by crop type. SANDAG projections of agricultural land conversions to other land use categories provide 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 prevailing distribution of crop acreages, long-term normal weather and economic trends, and expected growth in Water Authority wholesale water rates.

2.5.1 Projected Normal Water Demands

Projected baseline demand for normal water years is shown in Table 2-2. Baseline demand projections exclude future additional conservation savings and reflect historical conservation savings through 2023. To quantify all potential demands served by the Water Authority, a small increment of water use associated with known potential near-term annexations was incorporated into the demand forecast assumed to be online by 2030. Estimated demands for these parcels were provided to the Water Authority by associated member agencies 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 of Directors is required before water service may be provided to these lands. The forecast further incorporates out-of-region exchange demands as detailed in Section 2.3.

Table 2-2 Total Baseline Demand Forecast (Excludes Future Conservation) (AF)[a]

	2030	2035	2040	2045	2050
Baseline M&I Demand [b,c]	446,637	457,101	468,680	474,202	480,690
Baseline Agricultural Demand [b]	16,657	15,215	14,284	13,473	12,791
Near-Term Annexations [d]	6,009	7,136	7,136	7,136	7,136
Out-Of-Region Exchanges	20,000	20,000	20,000	20,000	20,000
Total Baseline Demand Forecast	**489,303**	**499,452**	**510,100**	**514,811**	**520,617**

Notes:

[a] Normal water year demands based on 1991-2020 weather.

[b] Incorporates Water Authority member agency demands derived from the Water Authority CWA-MAIN model, including 13,430 AF of demand for MCB Camp Pendleton

[c] Reflects historical conservation savings through 2023

[d] Known near-term annexation demands; member agency breakdowns are included in Appendix K.

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. Water Authority's member agency baseline demand projections listed in Table 2-2 represent water-use estimates for all income levels (including low-income households) contained in SANDAG Series 15 Regional Growth Forecast.

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 Baseline Demand Forecast.

2.5.2 Projected Future Conservation Savings

With the baseline forecast established, future water conservation savings are estimated. For over 30 years, conservation has been an important resource strategy for ensuring a cost-effective, reliable supply of water for the San Diego region. Local demands have decreased significantly since 1990, with an acceleration of water saving efforts during the 2014-2016 drought, when mandatory restrictions were in place. Now, water conservation efforts are aimed at meeting regulatory requirements and maintaining water use efficiency.

The Alliance for Water Efficiency Water Conservation Tracking Tool (AWE Tool) is listed in DWR's 2025 UWMP Guidebook as an application to assist water providers in developing savings estimates (DWR, 2025). This industry standard planning tool was used to provide granular estimates of existing and future "passive" or code-based water savings and "active" savings resulting from the implementation of demand management programs, including the response to regulatory targets. Water savings assumptions are calculated 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 model. Table 2-3 contains total future regional conservation savings projections.

Table 2-3 Projected Future Conservation Savings (AF)

	2030	2035	2040	2045	2050
Active Conservation	3,814	4,132	4,474	4,338	4,334
Passive Conservation (Post-2023)	3,574	4,887	5,759	6,297	6,524
Total Additional Conservation Savings	**7,388**	**9,019**	**10,233**	**10,635**	**10,858**

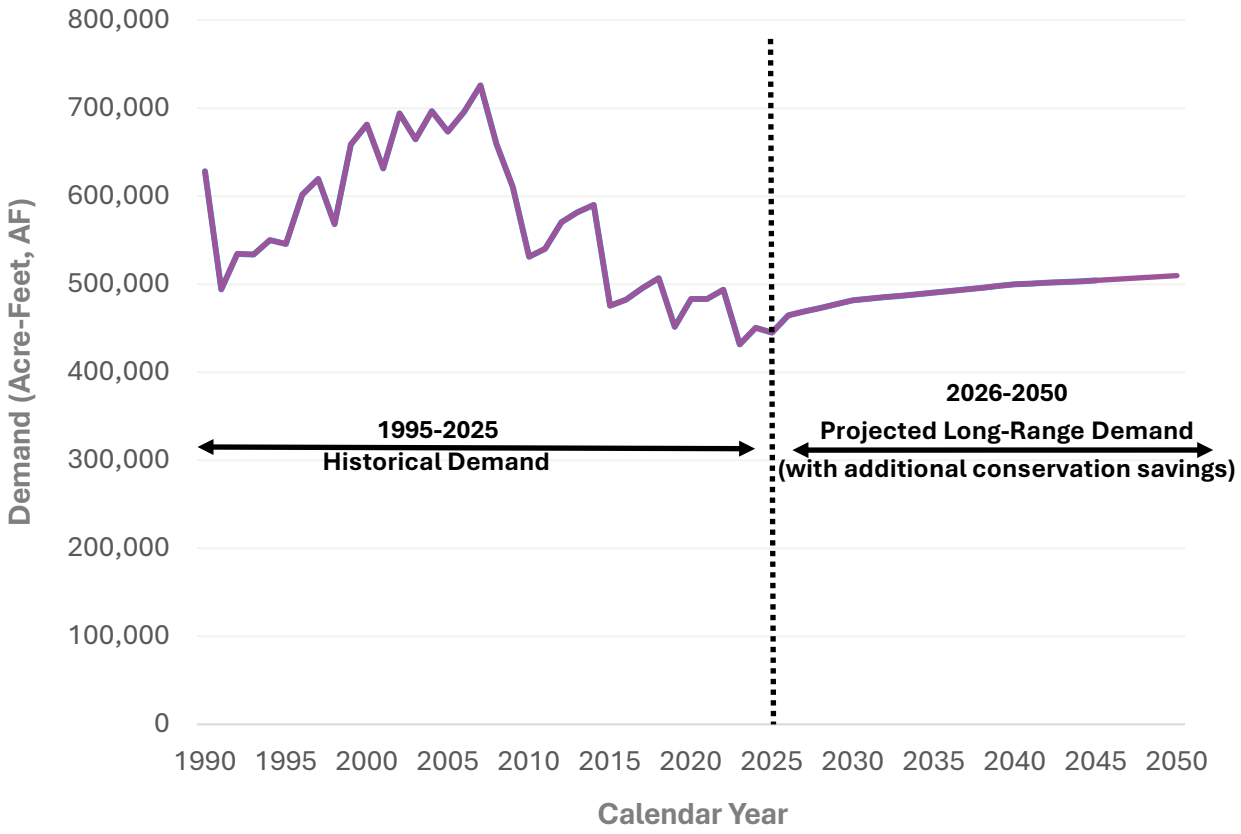
These conservation savings projections are then subtracted from the projected baseline demand forecast (Table 2-2) to give the long-range demand forecast in five-year increments (Table 2-4).

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

	2030	2035	2040	2045	2050
Total Baseline Demand Forecast	489,303	499,452	510,100	514,811	520,617
Additional Conservation	7,388	9,019	10,233	10,635	10,858
Total Long-Range Demand Forecast with Conservation	**481,915**	**490,433**	**499,867**	**504,176**	**509,759**

Figure 2-2 illustrates the forecasted trend in projected water demands over the 2026-2050 time period. This figure shows historical water use and forecasted normal year demands while accounting for future additional conservation savings and out-of-region exchanges.

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



2.5.3 Projected Member Agency Demand on the Water Authority

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

Table 2-5 Projected Member Agency Normal Year Demand on the Water Authority (AF) [a,b,c,d]

Member Agency	Historical	Projected				
	2025	2030	2035	2040	2045	2050
Carlsbad Municipal Water District	11,991	12,519	13,665	13,433	13,321	13,254
Del Mar, City of	921	961	973	973	965	960
Escondido, City of	11,231	3,795	3,768	4,034	3,942	3,902
Helix Water District	22,567	16,870	17,050	17,647	17,923	18,296
Lakeside Water District	3,113	2,826	2,842	2,861	2,960	3,069
Oceanside, City of	20,815	15,820	15,868	17,129	17,267	17,468
Olivenhain Municipal Water District	16,853	18,123	17,656	17,273	17,126	17,016
Otay Water District	28,612	30,853	33,541	38,429	42,329	46,346
Padre Dam Municipal Water District	9,651	7,581	7,820	8,057	8,172	8,316
Camp Pendleton, Marine Corps Base	140	120	120	120	120	120
Poway, City of	9,249	9,176	9,371	9,305	9,222	9,160
Ramona Municipal Water District	4,192	4,098	4,706	4,678	4,650	4,630
Rincon del Diablo Municipal Water District	4,857	5,627	6,034	6,165	6,154	6,159
San Diego, City of	118,844	106,855	49,775	52,947	53,921	55,361
San Dieguito Water District	4,923	5,731	4,982	3,308	3,292	3,292
Santa Fe Irrigation District	8,389	8,575	5,609	5,565	5,491	5,430
Sweetwater Authority	1,001	2,122	2,140	2,337	2,460	2,629
Vallecitos Water District	10,569	11,898	12,686	12,907	12,980	13,097
Valley Center Municipal Water District	12,918	13,929	12,832	11,684	10,755	9,969
Vista Irrigation District	5,516	4,964	4,969	5,059	5,007	4,996
Yuima Municipal Water District	3,344	925	925	932	4,425	4,425
Total	**309,696**	**283,368**	**227,332**	**234,843**	**242,482**	**247,895**

Notes:

[a] Based on San Diego Association of Governments (SANDAG) Series 15 Regional Growth Forecast.

[b] Includes historical and additional projected water conservation savings.

[c] Assumes member agency implementation of verifiable local supply projects.

[d] Includes near-term annexation demands shown in Table 2-2. A breakdown by member agency is included in Appendix K.

2.5.4 Projected Dry-Year Water Demands

In addition to a 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 historical high temperatures and low rainfall weather parameters resulting in maximum impact. Using this index, a representative single dry year was selected. For this forecast, the year 2014 was selected. Monthly weather patterns associated with 2014 were then substituted in the CWA-MAIN model to generate projections of dry-year demands. By holding all non-weather-related predictive variables constant, the model produced an annual forecast of dry-year weather-driven demand. Table 2-6 shows projected single dry-year demands net of future conservation savings for the Water Authority service area in five-year increments. Additionally, out-of-region exchange demands of 20,000 AF, as discussed in Section 2.3, are incorporated into the forecast.

Table 2-6 Single Dry-Year Water Demand Forecast Adjusted for Water Conservation (AF)[a]

	2030	2035	2040	2045	2050
Single Dry-Year Demand	518,213	528,788	539,978	544,868	550,997
Future Conservation Savings	(7,388)	(9,019)	(10,233)	(10,635)	(10,858)
Total Single Dry-Year Demands with Conservation	**510,825**	**519,769**	**529,745**	**534,233**	**540,139**

Notes:
[a] Includes near-term annexation demands (adjusted for dry-year condition) and out-of-region demands.

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. The 1% increase was not applied to the out-of-region exchange demand component.

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 and dry weather. Table 2-7 lists multiple dry-year demand projections net of future conservation savings.

Table 2-7 Multiple Dry-Year Water Demand Forecast Including Future Conservation Savings (AF)

	2026	2027	2028	2029	2030
Total Multi Dry-Year Demands with Conservation Savings	515,082	521,030	527,018	533,017	539,097
	2031	2032	2033	2034	2035
Total Multi Dry-Year Demands with Conservation Savings	515,733	520,690	525,697	530,754	535,862
	2036	2037	2038	2039	2040
Total Multi Dry-Year Demands with Conservation Savings	524,767	529,815	534,913	540,062	545,262
	2041	2042	2043	2044	2045
Total Multi Dry-Year Demands with Conservation Savings	534,843	539,991	545,191	550,443	555,748
	2046	2047	2048	2049	2050
Total Multi Dry-Year Demands with Conservation Savings	539,375	544,569	549,815	555,113	560,464

2.5.5 Projected Climate Change Impact on Water Demands

Evaluation of potential climate change impacts on water demand represents a practical planning exercise in water resources. Current national and international research offers a wide range of potential climate outcomes based on different scenarios modeled through various general circulation models (GCMs). The Water Authority adopted a qualitative evaluation approach using a manageable number of climate change scenarios from research sources to develop a range of potential demands.

Climate Data Sources

Advances in climate modeling have occurred since the release of the 2020 UWMP. Building from the original Localized Constructed Analog (LOCA) climate projections, this study makes use of the LOCA2-Hybrid California data set provided by Cal-Adapt's Analytics Engine (available online: https://analytics.cal-adapt.org/). These new projections are based on the following:

- New GCM forecasts with updated climate forcing assumptions from the World Climate Research Programme Coupled Model Intercomparison Project (CMIP), Phase 6 (CMIP6). Forcing scenarios contained in CMIP6 are named shared socioeconomic pathways (SSPs), of which there are three commonly used in GCM projections:
  - SSP245 (status quo warming) – this SSP assumes an additional radiative forcing of 4.5 watts per square meter (W/m^2) by 2100. This represents the medium pathway of future GHG emissions.
  - SSP370 (greater warming) – this SSP assumes an additional radiative forcing of 7 W/m^2 by 2100.

  - SSP585 (extreme warming) – this SSP assumes an additional radiative forcing of 8.5 W/m^2 by 2100, representing the upper boundary of the range in scenarios described in the literature.

- New methods for downscaling GCM forecasts to fine-scale temperature and precipitation simulations. LOCA2-Hybrid downscaled projections are available over the California domain at 3 Kilometer (km) grid resolution.[1]

The LOCA2-Hybrid California data set employs 15 GCMs selected from the CMIP6 collection that reproduce historical climate well over the California domain. Each scenario consists of time series simulations of historical and future (1950-2100) daily precipitation and maximum to minimum temperature for each 3-km grid cell according to a specific combination of GCM and SSP.

Selection of Scenarios for Demand Forecast Analysis

A total of 241 downscaled climate projections is available from the LOCA2-Hybrid California data set representing various combinations of GCMs and SSP scenarios.[2] The sheer number of scenarios available for analysis makes it impractical to forecast demand under each scenario. Instead, this study takes an approach of identifying a subset of scenarios that represent the middle and extremes of projected average temperature and precipitation among the scenarios, then forecasting demand using those scenarios only. Two sets of five scenarios, one reflecting 2045-2065 projections and the other reflecting 2080-2100 projections, were selected to represent:

- 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)
- 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. This resulted in 22 × 241 = 5,302 time series of daily precipitation and maximum daily temperature covering 2045-2065 or 2080-2100, one for each scenario and member agency.

Using these data, each scenario was summarized regionally by projected average monthly total precipitation and monthly average daily high temperature.

- Average monthly total precipitation and average monthly maximum daily temperature were determined for each scenario time series in each grid cell and year interval

[1] According to the Data Adoption Justification Memo for California's Fifth Climate Change Assessment, "the [LOCA2-Hybrid] method is a form of hybrid downscaling since it couples the statistical downscaling approach of LOCA with a pattern library obtained from a dynamically downscaled model containing information about the historical and future climate."
[2] There are 15 GCMs × 3 SSPs = 45 combinations of GCMs and SSPs available in the LOCA2-Hybrid California data set. However, most combinations were simulated multiple independent times to portray projection uncertainty, leading to 241 total available scenarios.

- Projected temperature and precipitation were then averaged within each scenario and year interval, but across all member agency grid cells, producing 241 data points of regional average precipitation and temperature for each time interval, one point for each scenario. Figure 2-3 and Figure 2-4 show point values for the two-year intervals
- Point values for temperature and precipitation were then independently standardized in each year interval by removing the mean across scenarios and dividing by standard deviation across scenarios. Figure 2-5 and Figure 2-6 show standardized point values for the two-year intervals.

Next, the distribution of temperature and precipitation summaries was characterized. The 95th, 5th, and 50th percentile values were calculated for each variable (dashed lines in Figure 2-3 through Figure 2-6). Then, approximate joint range of scenario weather was specified as combinations of percentile values of temperature and precipitation values, as follows:

- 95th percentile temperature and 95th percentile 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 (intersections of horizontal and vertical line in real-space Figure 2-3 and Figure 2-4; standardized Figure 2-5 and Figure 2-6).

The final step of scenario selection process involved the identification of individual points that have standardized 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 whose points were closest to “ideal” conditions were chosen as the representative climate change scenarios (dark circles with callouts in real-space Figure 2-3 and Figure 2-4; standardized Figure 2-5 and Figure 2-6). The five climate change scenarios selected for 2045-2065 and 2080-2100 are shown in Table 2-8.

Table 2-8 Climate Change Scenarios Selection Criterion

	2045-2065		2080-2100	
Scenario	Full Scenario Name	SSP	Full Scenario Name	SSP
Cool/Wet	MIROC6.ssp245.r2i1p1f1	SSP245	FGOALS-g3.ssp370.r5i1p1f1	SSP370
Cool/Dry	MPI-ESM1-2-HR.ssp370.r2i1p1f1	SSP370	MIROC6.ssp245.r3i1p1f1	SSP245
Moderate	CESM-LENS.ssp370.r2i1p1f1	SSP370	EC-Earth3-Veg.ssp245.r4i1p1f1	SSP245
Warm/Wet	ACCESS-CM2.ssp585.r1i1p1f1	SSP585	HadGEM3-GC31-LL.ssp585.r2i1p1f3	SSP585
Warm/Dry	KACE-1-0-G.ssp585.r1i1p1f1	SSP585	EC-Earth3.ssp585.r4i1p1f1	SSP585

Figure 2-3 Selected Scenarios for 2045-2065 Time Period (Real-Space Summary Values)

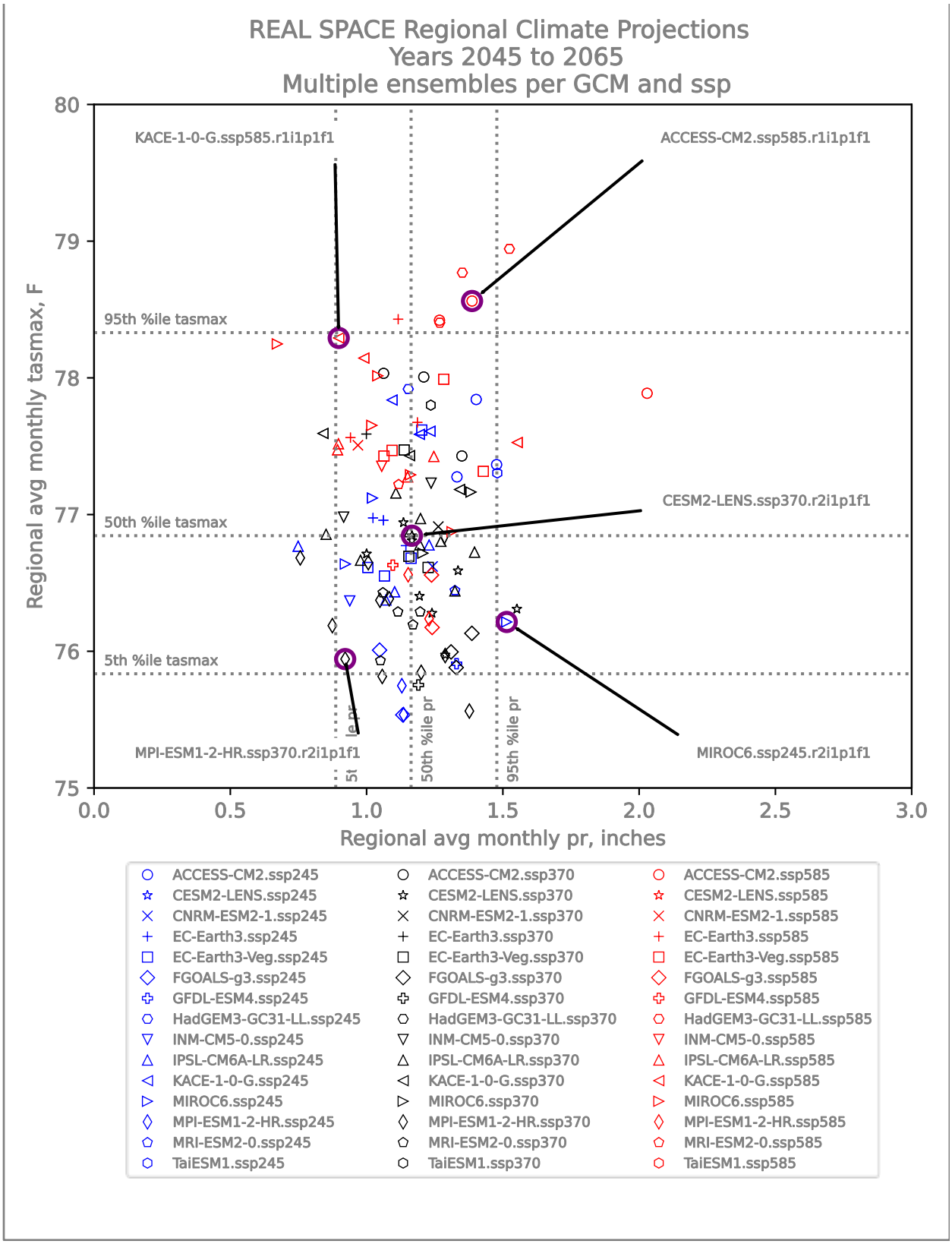


Figure 2-4 Selected Scenarios for 2080-2100 Time Period (Real-Space Summary Values)

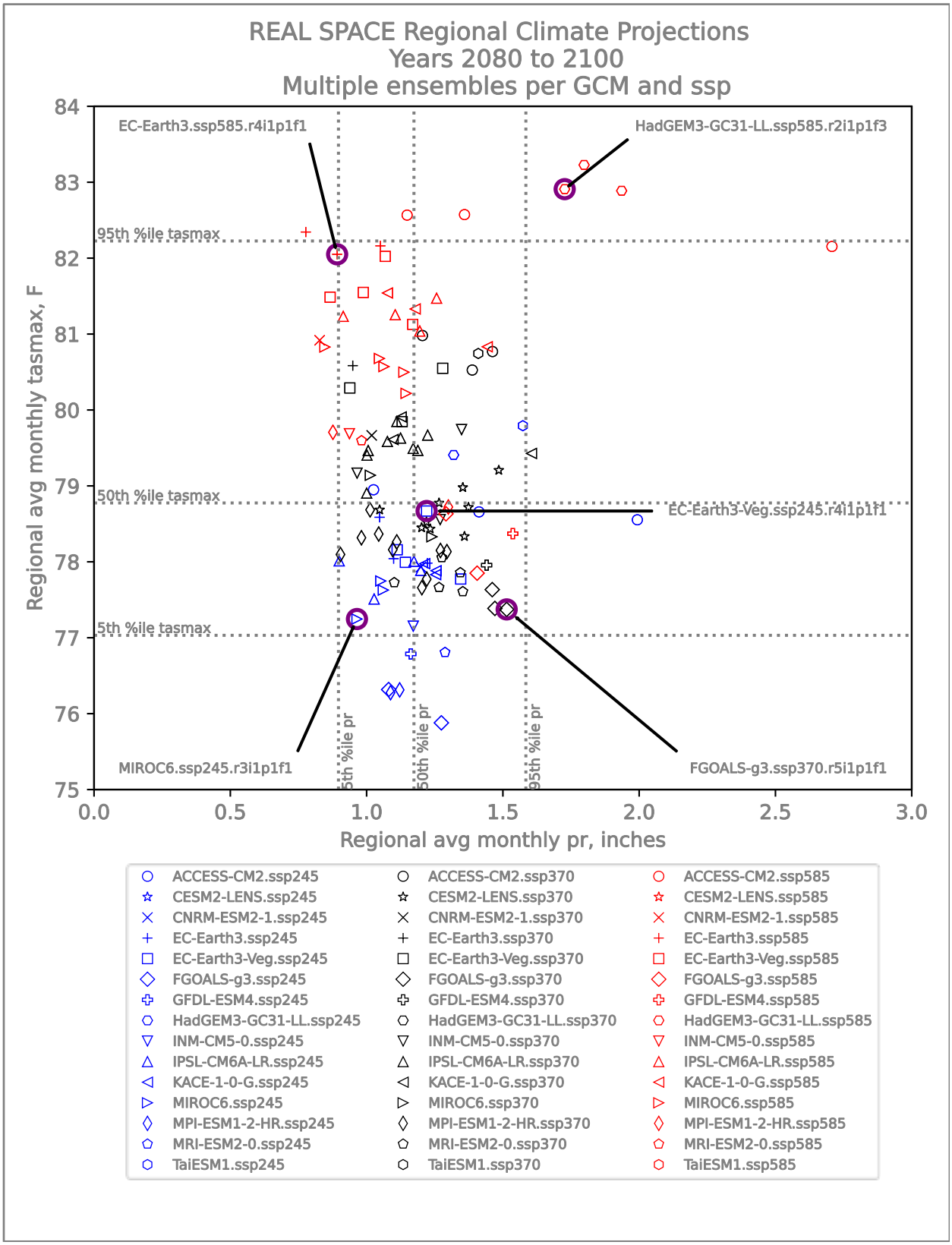


Figure 2-5 Selected Scenarios for 2045-2065 Time Period (Standardized Summary Values)

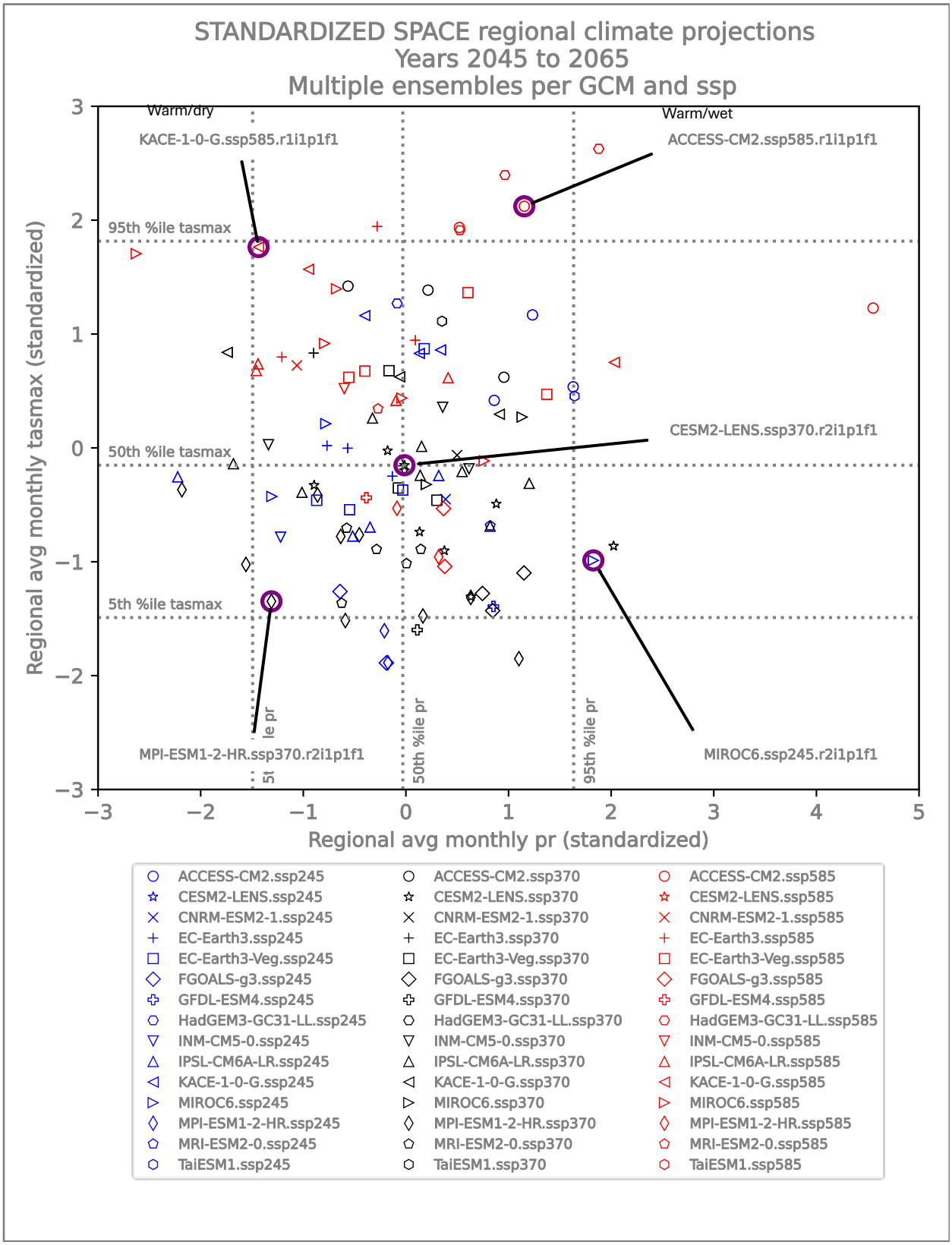
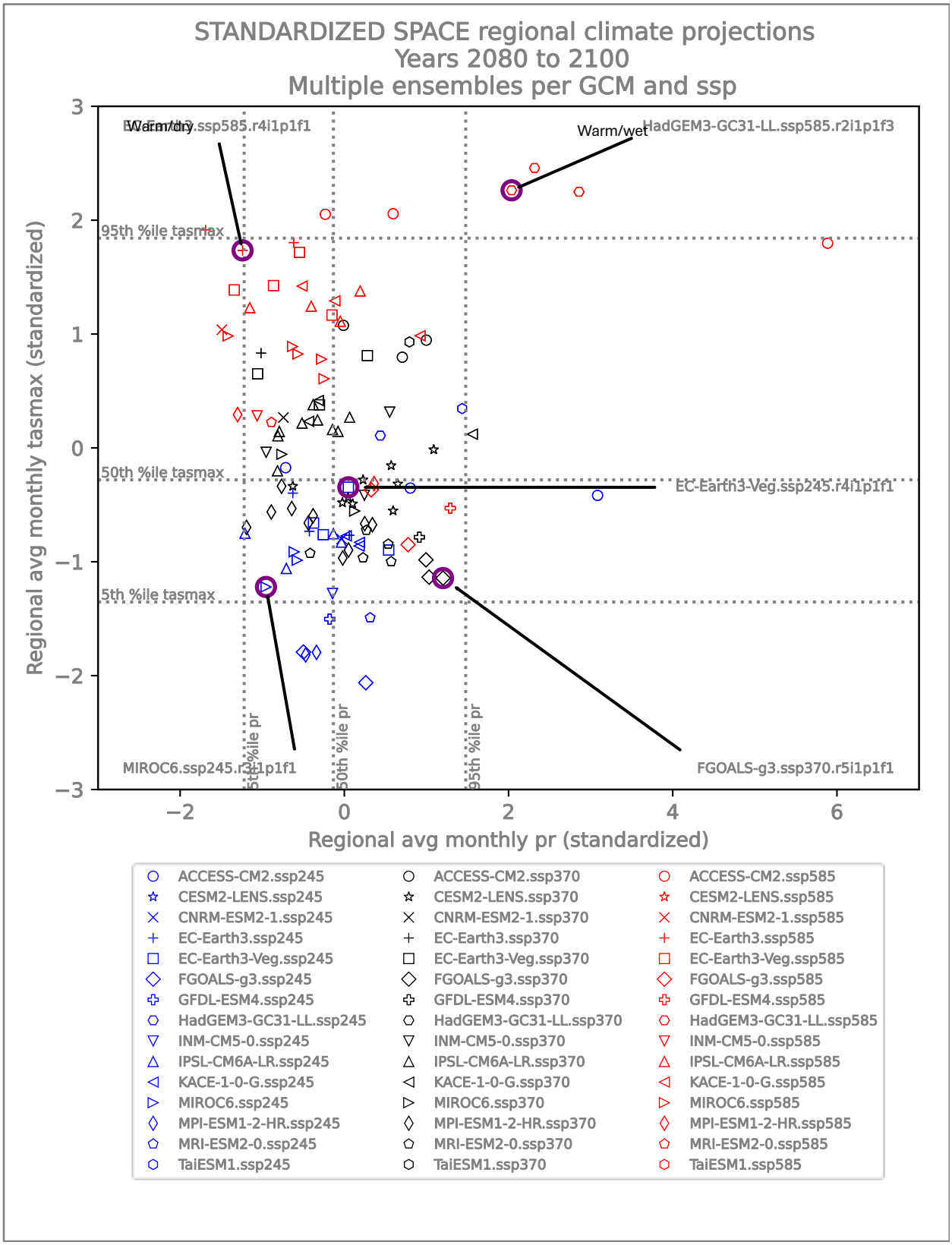


Figure 2-6 Selected Scenarios for 2080 -2100 Time Period (Standardized Summary Values)



Climate Change Forecast Results

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 for the 2045-2065. On average, projections suggest annual amounts of precipitation will remain heavily concentrated in the winter months (December-March). Two climate scenarios resulted in average annual precipitation estimates for 2045-2065 lower than the 1991-2020 historical average. All selected scenarios for 2045-2065 indicate warming on average relative to historical climate conditions. Projected precipitation patterns and annual precipitation totals were similar for 2080-2100, however projected increases in temperature are distinctly higher than in the 2045-2065 scenarios.

The interaction of projected temperatures, precipitation, and member agency-specific weather parameters from the water use model dictate estimated impact on baseline demand forecasts. The estimated range of climate change impacts on Water Authority's water demands was calculated by substituting the five climate scenarios in 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 precipitation and temperature data for the individual member agencies' grid cell. This ensured demand forecasts for various member agencies were derived for a consistent scenario providing more accurate representation of real contemporaneous weather regionally, and be sensibly aggregated to regional totals while retaining climatic heterogeneity typical to the San Diego region.

Under the 2045-2065 climate projection period, all climate scenarios result in relatively small increases in 2050 total water demand, ranging from a 0.4% (Moderate) to 3.2% (Warm/Dry) increase relative to in-region baseline forecast under historical normal weather. The results imply a greater influence of warming temperatures relative to precipitation for scenarios selected.

Using 2080-2100 climate projections and selected models, the projected impacts range from a 2.1% increase in 2050 total water demand under the Cool/Dry scenario to a 10.7% increase in member agency water demand under Warm/Dry scenario, relative to historical normal weather baseline. This is consistent with persistent warming simulated to occur through the end of the century and suggests more significant water demand impacts may occur beyond the planning horizon of this 2025 UWMP (2030-2050).

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Chapter 3: Demand Management

3.1 Introduction

Demand management is an important ongoing component of the Water Authority's long-term strategy to ensure water resilience in the San Diego region. This chapter outlines the regulatory drivers for demand management and describes programs, partnerships, and funding for program elements, as well as public outreach efforts and other demand management initiatives. These efforts have built awareness and public acceptance for water use efficiency as a desirable lifestyle and a permanent civic responsibility. Recent planning updates, including out-of-region exchange agreements incorporated through adjustments to projected demands, do not affect the Water Authority's demand management strategy, which continues to focus on long-term efficiency and conservation.

Since the 1990s, the Water Authority has continuously promoted water use efficiency through the implementation of best practices, innovative program offerings, and award-winning education. Demand has steadily trended downward over the past 30 years, with peak demand drops during drought response, followed by slower periods of demand reduction through the early 2000s. Since 1990, per-capita water use has decreased by over 50%, reducing the need for imported water to meet regional demands.

In 2009, SB X7-7 set mandatory targets for water demand reduction requiring retail urban water agencies within the state to achieve a 20% reduction in urban per capita water use by December 31, 2020 (Water Code Section 10608.20). While the water use reduction targets established by SB X7-7 did not directly apply to the Water Authority as a wholesale supplier, the Water Authority supported its retail member agencies' compliance efforts through regional and locally administered water conservation programs, measures, and policies, as well as the use of recycled water, consistent with Water Code Section 10608.36. The Water Authority's member agencies met 2020 targets established as reported in their individual 2020 UWMPs. In accordance with the DWR's 2025 UWMP Guidebook, SB X7-7 reporting is not required in 2025 UWMPs, and the previous SB X7-7 reporting tables have been replaced with reporting requirements for UWUO targets. The Water Authority will continue to support its member agencies' achievement of UWUOs through its regional programs. See Section 1.1, *California Urban Water Management Planning Act*, and Section 1.2, *Water Conservation Legislation*, for further discussion of UWUOs.

From 2014 through 2016, the state experienced unprecedented drought which prompted a statewide response mandating a 25% reduction in potable urban water use in California. In April 2015, Executive Order B-29-2015 directed the 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% using 2013 water use rates as the baseline. Suppliers were assigned water-use saving targets based on their residential gallons per capita per day (R-GPCD) rates. Suppliers with higher R-GPCD were required to meet higher demand reduction targets. The San Diego region responded to mandatory demand reduction targets with dramatic decreases in water demand. Targets were adjusted and then removed in 2016, but demand has continued to remain low over the past decade.

In 2016, Governor Brown issued Executive Order B-37-16, establishing "Making Conservation a California Way of Life" and directing State agencies to strengthen prohibitions of water waste and

advance long-term efficiency practices. Building on this directive, the Legislature adopted SB 606 and AB 1668 in May 2018, creating a statutory framework that required the DWR and the SWRCB to develop and implement long term water-use efficiency standards for indoor residential water use, outdoor irrigation, water loss, and CII performance measures. To further these statewide efficiency goals, California enacted AB 1572 in 2023 (effective January 2024), which prohibits the use of potable water for irrigation of nonfunctional turf in CII and common-interest development landscapes. In accordance with AB 1572, water suppliers are required to restrict the irrigation of grass in areas with no recreational or practical purpose.

As a wholesaler, the Water Authority is not required to meet water-use efficiency targets or implement best practices. However, the Water Authority continues to assist its retail member agencies to meet water-use efficiency targets and regulatory requirements. Active measures and programs include residential and commercial device incentive programs; direct install programs in disadvantaged communities; agricultural irrigation efficiency rebates; water use surveys; and educational programs. In addition to participation in its own programs, the Water Authority also participates in and provides input to Metropolitan's regional programs, and partners with SDG&E on water and energy saving programs. Through these collaborations, the Water Authority provides regional tools and resources that improve water users' knowledge of how to effectively reduce outdoor water use as described in this chapter.

3.2 Water Use Efficiency Program and Achievements

For over 30 years, the Water Authority has been a leader in promoting water use efficiency through programs and partnerships. This section provides information on Water Authority achievements in water use efficiency, including grant funding, partnerships, education and outreach programs, local and regional rebate and incentive programs, tools, and resources to support accelerating 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 state regulatory requirements, as well as assist with water affordability concerns. More detailed information on current programs is available on the Water Authority's website (WaterSmartSD.org).

3.2.1 Program Resources

External Funding

The Water Authority funds 90% of its water use efficiency programs through grants, partnerships, and other external funding sources.

Grants

Since 2020, the Water Authority has been awarded $7 million in grant funds for water use efficiency projects and programs from both USBR and DWR. The required funding match for these grants primarily uses external funding from partners to reduce the overall cost to the Water Authority.

Metropolitan Member Agency Administered Program Funding

Metropolitan administers funding for locally tailored water use efficiency projects through its Member Agency Administered Program (MAAP). As a Metropolitan member agency, the Water Authority received an annual MAAP allocation for fiscal years 2025 and 2026 of $1,661,000. The

Water Authority administers several regional programs that are partially funded through MAAP, including direct-install programs for toilet and non-functional turf replacement in low-income communities, leak detection device pilot studies, school education programs, and state framework workshops.

In addition to MAAP funds, Metropolitan has also made available $100,000 in leak detection funding during both two-year budget periods since 2022, including $100,000 for the 2022-2024 period and $100,000 for the 2024-2026 period. Most recently, this funding supported a project to purchase in-line leak detection technology which aids in performing pipe inspections for asset management without the need for draining the inspection area, saving water during the inspection and preventing water waste from leaking pipes.

Partnerships

SDG&E has been a longtime partner in implementing the collaborative Water/Energy Nexus Program. In addition to program implementation, SDG&E has provided funding through its Palomar Energy Center for water use efficiency related activities. The County Watershed Protection Program partners with the Water Authority on projects that support stormwater capture, landscape education, outreach materials, commercial landscape conversion projects, agricultural irrigation inspections, and device rebate programs. Most active and recent programs have received external funding and are further described in Section 3.2.3, *Program Elements*.

3.2.2 Water Authority Staffing

The Water Authority Water Resources Department has one full-time efficiency position dedicated to implementing regional water use efficiency programs, providing technical assistance to member agencies, and implementing regional programs to support member agency compliance with state regulations.

3.2.3 Program Elements

The Water Authority has implemented a significant number of programs since 1991, responding to both immediate and future needs. The following Table 3-1 has grouped programs into five categories, which represent the current focus areas of Turf Replacement, Audits and Surveys, Water Saving Devices, Education, and Studies.

Table 3-1 Demand Management Programs

Program Type	Description
Turf Replacement	• Turf Rebate Program • Large Landscape Direct Install Pilot Program
Audits and Surveys	• LEAVES Program • Agriculture Irrigation Efficiency Program • Landscape Irrigation Surveys • Residential Water Use Surveys
Water Saving Devices	• SoCal Water$mart Residential Program[a] • SoCal Water$mart CII Program • Direct Install Toilet Program

Program Type	Description
	• Water and Energy Efficiency Program • Correctional Facility Retrofit Program
Education	• Landscape Makeover Series • Landscape Makeover Videos on Demand • Professional Certification Programs • *eGuide to a WaterSmart Lifestyle*[b] • *A Homeowner's Guide to a WaterSmart Landscape*[b] • *Nifty 50* and *Happy 100* plant brochures • Water Conservation Garden
Studies	• Residential Water Use Trends

CII = commercial, institutional, and industrial; LEAVES = Landscape Efficiency and Value Enhancement Solutions; SoCal = Southern California

[a] "Water$mart" is a rebate program administered by the Metropolitan Water District of Southern California that provides financial incentives to install water-efficient devices and landscaping.

[b] "WaterSmart" is a federal program administered by the U.S. Bureau of Reclamation to fund projects that improve water conservation, drought resilience, and supply reliability.

Turf Replacement Programs

Turf Rebate Program

Turf replacement rebate programs have been a long-standing staple of the Water Authority water use efficiency program and are available to both residential customers and CII customers. From 2012 to 2018, the Water Authority implemented several grant-funded regional turf replacement rebate programs. These programs promoted outdoor water use efficiency through financial incentives and resulted in the replacement of 1.4 million square feet of water-intensive turf grass with climate appropriate plants, efficient irrigation systems, and stormwater management features. Since late 2018, the Water Authority has participated in Metropolitan's SoCal Water$mart regional turf rebate program by periodically contributing supplemental funding when grant funds are unavailable. More than 44 million square feet of turf grass has been removed in the Water Authority service area under this program. In the next few years, California's turf replacement requirements will move beyond pilot projects and become phased statewide mandates, with potable water irrigation of nonfunctional turf prohibited across more property types by 2027–2028.

Large Landscape Direct Install Pilot Program

The Water Authority is actively engaged with seven different Disadvantaged Communities (DAC) sites to replace 70,000 square feet of irrigated non-functional turf with water-wise, climate-appropriate landscaping. This pilot program is intended to show that landscapes can use water efficiently and also be beautiful on the properties where the pilot program has been implemented. This program supports state regulatory requirements to eliminate potable water use on non-functional turf grass and is intended to demonstrate water savings over the 2025-2026 budget cycle, aligning with the state's phased ban on potable water irrigation of nonfunctional turf which begins enforcement in 2027-2028.

Funding for this pilot program is provided by a Proposition 1, Round 2, Integrated Regional Water Management (IRWM) implementation grant from DWR as well as Metropolitan MAAP funds. This funding is tied to a five-year contract cycle and is scheduled to conclude around 2027. The pilot program funding is transitional, helping DACs replace turf now, but long-term compliance will rely on state mandates and ongoing rebate programs such as but not limited to Metropolitan's SoCal Water$mart.

Audit and Survey Programs

Landscape Efficiency and Value Enhancement Solutions Program

The Landscape Efficiency and Value Enhancement Solutions (LEAVES) program began in Fall 2024 and supports increased water use efficiency at large commercial properties such as golf courses, HOAs, public agencies and agriculture with enhanced rebates, irrigation surveys and incentives. This program also provides direct rebates for replacement of overhead spray to drip irrigation conversion. The earlier version of this program, WaterSmart Contractor Incentive Program (WSCIP), occurred 2019 through 2023. LEAVES is funded through Proposition 1 Rounds 1 and 2 IRWM Implementation grants from DWR as well as MAAP funds from Metropolitan.

Agricultural Irrigation Efficiency Program

The Water Authority Agricultural Irrigation Efficiency Program has provided agricultural water management services since 1990. Over that period, more than 2,500 agricultural irrigation system evaluations were performed on over 40,000 acres of crops for avocados, citrus, field flowers, and other fruits and ornamentals. The program supports growers with technical assistance to improve or validate irrigation efficiency and obtain the maximum economic benefit.

Additional assistance is also provided in the program through visual observations of the irrigation system, examination of soil and crop materials, pump testing, and advisory support. At each site visited, a written report is prepared which summarizes the irrigation system's hydraulic characteristics and soil profiles and provides recommendations to improve overall system efficiency. Local weather data and crop water demand information are also provided. The program is intended to support potential improvements in crop yield and water savings realized from improvements in irrigation efficiency, and a rebate program is available to growers implementing the recommendations made. Follow-up service is provided to validate system improvements that have been implemented or to encourage implementation of the recommendations. This program is currently funded by a Proposition 1 Round 1 IRWM Implementation grant from DWR and by the County Watershed Protection Program.

Landscape Irrigation Surveys

Landscape irrigation surveys are available through Metropolitan to 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. Over 300 properties covering over 1,600 acres have been surveyed through this program since the program's inception in the mid-2000s. There is no fixed end date for Metropolitan's Landscape Irrigation Surveys program; however, funding is limited and offered on a first-come, first-served basis. New and complementary programs are being rolled out alongside it, focusing on rebates, direct-install projects, and broader conservation initiatives.

Residential Water Use Surveys

Metropolitan offers free in-person and virtual indoor and outdoor residential water use surveys. These one-time surveys provide customers with recommendations to improve landscape and indoor water use efficiency and inform customers of any rebates available. 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.

The Residential Water Use Surveys program is ongoing without a fixed end date, but its availability depends on funding and demand. Metropolitan is broadening its conservation approach with rebates, direct-install turf replacement, and community-based programs, to support long-term compliance with California's efficiency mandates (AB 1668, SB 606, AB 1572).

Water Saving Device Programs

SoCal Water$mart Residential Program

The SoCal Water$mart regional residential program, through Metropolitan, offers rebates for qualifying indoor and outdoor products including high-efficiency clothes washers, premium high-efficiency toilets, weather-based irrigation controllers, rotating sprinkler nozzles, rain barrels, cisterns and soil moisture sensor systems. In 2008, the Water Authority began participating in SoCal Water$mart and implemented a similar program from 2012 through 2018 when Metropolitan was not implementing the SoCal Water$mart program. Since 2020, over 6,500 high-efficiency clothes washers, 500 high-efficiency toilets, and other water saving devices were installed in the San Diego region, providing an estimated lifetime water savings of more than 3,000 AF. Since 2008, the estimated lifetime water savings exceeds 125,000 AF when coupled with residential turf replacement rebates.

The SoCal Water$mart Residential Program is ongoing, but rebates depend on funding and may change over time. Metropolitan is broadening its conservation strategy with higher turf replacement incentives, direct-install projects, and community-based programs designed to provide residential customers with multiple pathways to conserve water and comply with California's efficiency framework.

SoCal Water$mart CII Program

The SoCal Water$mart CII program offers rebates to replace select, older, inefficient devices with water-efficient devices. Since 2020, over 27,000 water-efficient devices were installed in the San Diego region through this program, providing a lifetime water savings of more than 7,300 AF. Water savings from rebated devices and CII turf replacement since 2012 exceed 115,000 AF. A selection of the types of water-efficient devices available through the SoCal Water$mart CII Program is 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 flow control valves	Weather based irrigation controllers Rotating and large rotary nozzles In-stem flow regulators Soil moisture sensor systems Irrigation master valve and flow sensors
Food Equipment	**HVAC Equipment**
Connectionless food steamers Air-cooled ice machines Food defrosting equipment	Cooling tower conductivity controllers Cooling tower pH controllers
Medical and Dental Equipment	**Commercial Incentives**
Dry vacuum pumps Laminar flow restrictors	Commercial turf removal incentives

CII = commercial, institutional, and industrial; HVAC = heating, ventilating, and air conditioning

Direct Install Toilet Program

The direct install toilet program provides a service to DAC and underrepresented communities for the professional installation of high efficiency 0.8 or 1.1 gallons per flush (gpf) toilets that replace toilets with 1.6 gpf or more. In addition to reducing per flush water usage, these replacements also reduce water loss due to leaking toilets, which is noted, if observed, by the installers. This program has been funded through grants from DWR and with MAAP funds from Metropolitan.

Water and Energy Efficiency Programs

For over 35 years, the Water Authority, its member agencies, and SDG&E have partnered to support homeowners in the County to increase water and energy efficiency. From 2018 to 2022, the Water Authority and SDG&E expanded this collaboration to share in the cost of plumbing devices and appliances that save both energy and water by developing the Energy Savings Assistance (ESA) program. The ESA program is 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 at no cost. Water efficient devices that have been installed include showerheads, faucet aerators, and thermostatic tub diverters, which are estimated to save more than 3,200 AF over the ESA program's 10-year lifetime. Coordination continues with SDG&E to cross-share programs that have both water and energy savings elements.

Correctional Facility Retrofits Project

Based on the success of a similar grant-funded project at Kearny Mesa Detention Facility, 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 was completed in 2024 and is projected to save 860 AF over its 10-year lifetime. Equipment for these retrofits was funded through Proposition 84 Round 4 IRWM Implementation grant from DWR.

Customer Education and Workforce Training Programs

Consistent with the Water Authority's focus to promote the long-term market transformation of conventional urban landscapes to more water-efficient and sustainable landscapes, a variety of education and training opportunities for customers and landscape industry professionals is offered. 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 member agencies.

Landscape Makeover Program

Initiated between 2014 and 2024, the Water Authority's WaterSmart landscape makeover program included a workshop series to provide homeowners with an overview and the basic skills necessary for successful conversion of a traditional turf grass yard into a WaterSmart landscape. Participants who completed the workshops were given the opportunity to receive technical assistance, including a professional site inspection, design consultation, and development of a scaled base plan. Upon completion, participants had a ready-to-implement WaterSmart landscape. This program transitioned to Metropolitan's Water Efficient Landscaping class series in 2024, offering both virtual and in-person classes several times per week.

Landscape Makeover Videos on Demand

To help make the WaterSmart landscape makeover program 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, landscape maintenance, and capturing rainwater to prevent urban stormwater runoff.

Professional Certification Programs

The Water Authority introduced the Qualified Water Efficient Landscaper (QWEL) training program to the County as a workforce training opportunity to help landscape industry professionals learn the latest techniques for landscape water use efficiency to support compliance with the Model Water Efficient Landscape Ordinance (MWELO). Originally developed by the Sonoma-Marin Saving Water Partnership, QWEL is recognized by the U.S. Environmental Protection Agency (EPA) as a WaterSense-labeled Professional Certification Program for Irrigation System Audits. While this Water Authority program ended in 2023, similar training is available through Metropolitan. Metropolitan's Water Efficient Landscape Dual Certification Program (WELDCP) offers combined QWEL and California Landscape Contractors Association (CLCA) Certified Water Manager certifications. WELDCP classes are available every spring and fall in the San Diego region.

WaterSmart Lifestyle eGuide

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.

WaterSmart Landscape Homeowner's Guide

A *Homeowner's Guide to a WaterSmart Landscape* offers instructions for homeowners who want to make their landscapes more water efficient. The guide reflects the state MWELO standards and explains the principles of WaterSmart landscape design and irrigation, climate-appropriate plants and Best Management Practices.

Nifty 50 and Happy Hundred Plant Brochures

The *Nifty 50* and *Happy 100* plant brochures provide users with information on specific low and very-low water plants in the San Diego region. These brochures offer a shortcut to water-wise plant selection in coordination with local nurseries to ensure plants are representative of public availability. The *Happy 100* brochure is a sortable list to support selection of plants by a preferred color palette, blooming season, typical plant sizes, and provides pruning information. In addition, the *Happy 100* brochure provides a "Sturdy Thirty" designation for plants that thrive in challenging soil environments.

Water Conservation Garden

The Water Conservation Garden opened in 1999 to educate the public on how to conserve water in landscapes. The garden spans 6 acres, adjacent to Cuyamaca College in the eastern part of the Water Authority service area and is open to the public Tuesday through Saturday. The garden showcases 16 different mini-gardens and exhibits and provides education programs for schools, public outreach, low-water use classes and workshops, and hosts community events.

The Water Authority was a member of the Water Conservation Garden Joint Powers Authority (JPA) from 2001 to 2025 and continues to promote the location through social media accounts to support continued education in water-efficiency landscaping. Although its formal membership in the JPA concluded in 2025, the Water Authority continues to actively support the Water Conservation Garden by promoting it through social media channels and public outreach efforts to promote awareness of the resources available for learning about climate-appropriate landscapes, efficient irrigation, and sustainable gardening practices.

Studies & Other Programs

Residential Water Use Trends

In 2024, the Water Authority initiated a study to understand residential water use trends in its service area by examining data from existing flow sensors installed throughout the San Diego region. The direct distribution program to expand sensor coverage is currently underway (2024-2026) and is being funded through Metropolitan's MAAP. The program includes a direct installation program for DAC customers. Once sufficient sensor data is collected, the Water Authority will analyze usage patterns to inform its efficiency programs and outreach strategies; this phase is expected to run through 2027. This data will provide information on residential water use demands and inform water-use efficiency programs and public outreach strategies. This program is expected to conclude once the expanded sensor network has generated enough data to provide defensible residential water use trends, which is also anticipated to be around 2027, after which time the results of sensor coverage will be integrated into ongoing efficiency programs rather than continuing as a standalone project.

3.3 Metering

The Water Authority's water supply system is fully metered. Biannually, flow meters attached to a service take-off (such as a flow control facility) are calibrated and serviced by Water Authority staff from the Operations and Maintenance Department. All calibration instruments used are National Institute of Standards and Technology (NIST) traceable.

3.4 Public Education and Outreach

The Water Authority has consistently promoted water use efficiency programs through its communications and outreach channels as part of its overall long-term supply diversification strategy. 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. 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 statewide water-wasting practices.

3.4.1 Promoting WaterSmart Programs

For 15 years, 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. In addition to outreach programs and classes, the Water Authority has promoted participation in Metropolitan's SoCal Water$mart and BeWaterWise rebate programs. The Water Authority shares these resources 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 public-private partnerships.

3.4.2 Managing Demand Through Outreach

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 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 though engagement with 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 implemented by the Water Authority include those listed below. These outreach programs and tactics promoted through the Water Authority's social media accounts listed are either created by the Water Authority or through other similar state, federal, and San Diego regional efforts.

- Outreach Programs and Tactics:
  - Imagine a Day without Water and San Diego – Brought to You by Water –social media campaigns highlighting the importance of a safe and reliable water supply
  - Water Awareness Month (promoted annually during the month of May)
  - Fix a Leak Week (promoted annually through Project Clean Water)
  - Faces of the Water Industry – highlights local water professionals and their roles
  - Reuben H. Fleet Science Center Exhibit
- Media Relations
- Civic/Community Partnerships
- Social Media
  - Facebook, X, Instagram, LinkedIn, YouTube, Nextdoor
- Communications
  - WaterSmartSD.org, Water Authority conservation webpage
  - Joint Public Information Council and Conservation Coordinators
  - WaterSource e-Newsletter
  - Water News Network (debuted September 2018)
  - Annual Reports (available online at sdcwa.org)
  - Support for member agencies that sponsor local landscape contests

3.5 Asset Management

For over 30 years, the Water Authority asset management program has been implemented by the Operations and Maintenance Department. The program's mission is to prevent service disruptions by repairing infrastructure before problems arise and by extending the life of equipment and facilities. Water Authority staff retain a detailed inventory of all assets and conduct regular inspections using tools such as visual checks, internal and external reviews, and real-time monitoring. A key component of the program incorporates real time pipe monitoring through various methods, including acoustic fiber optics, cathodic protection, remote operated vehicle inspections, and electromagnetic and in-line leak detection technology. These methods improve the ability to monitor and inspect Water Authority pipelines, reducing the likelihood of unplanned water releases due to breaks, and reducing the need to drain pipes to perform inspections in certain circumstances. This program is essential to support the replacement and repair of pipelines, aqueduct-related structures, and metering and flow control facilities.

3.6 Conclusion

Water-use efficiency will continue to play a central role in the Water Authority's efforts to maximize the reliability of the San Diego region's water supply through diversification. The achievements in water-use efficiency discussed in this chapter provide a foundation for existing and future measures, programs, and policies. The Water Authority will continue to support its member agencies' efforts to comply with the water-use efficiency standards required under the long-term state water-use efficiency framework.

3.7 References

None.

Chapter 4: Water Authority Supplies

4.1 Introduction

This chapter documents the Water Authority's existing and projected supply sources.

4.1.1 Background

Historically, the Water Authority relied exclusively on imported water supplies purchased from Metropolitan to meet regional demands. Metropolitan water supplies are derived primarily from two sources, the SWP and the Colorado River. Following significant supply reductions from Metropolitan during the 1987-1992 drought, the Water Authority initiated a strategic, long-term effort to diversify and enhance the reliability of its water supply portfolio. Over the past two and a half decades, comprehensive regional supply and infrastructure planning have guided the implementation of these diversification initiatives.

In 1993, the Water Authority developed a Water Resources Plan and updated this plan in 1997 (Water Authority, 1993; 1997). The Water Resources Plan emphasized the importance of developing local supplies and core water transfers. Consistent with the 1997 plan update, in 1998 the Water Authority entered into a Water Conservation and Transfer Agreement (Transfer Agreement) with IID, an agricultural district in neighboring Imperial County. The Water Authority's 1997 Water Resources Plan update had a planning horizon through 2015 but no formal sunset clause. It was intended as a long-range framework and was later replaced by updated UWMPs and integrated planning documents.

The 1998 Transfer Agreement committed IID to conserve water through on-farm and system efficiency improvements, and to transfer that conserved water to the Water Authority. The 1998 Transfer Agreement was later formalized and expanded under the 2003 QSA. In accordance with the Transfer Agreement and the QSA, the first transfer from IID to the Water Authority was 10,000 AF, with the volume increasing per the agreement terms annually until it reached 200,000 AF in 2021. This supply source will continue to provide up to 200,000 AFY through 2047 and can be extended to 2077 if both the Water Authority and IID agree to the extension. As part of the QSA, the Water Authority secured a long-term supply of 77,700 AFY of conserved water generated through canal lining projects for the All-American Canal and Coachella Canal through 2112. Deliveries from the Coachella Canal lining project began in 2007, followed by deliveries from the All-American Canal lining project beginning in 2010. These QSA supplies (totaling 277,700 AFY) are classified as verifiable Water Authority supplies, meaning they are supported by existing infrastructure, contractual agreements, or regulatory approvals (see Chapter 5. *Member Agency Supplies*, for definitions of supply categories).

To enhance regional water supply reliability and diversification, the Water Authority's 2005, 2010, and 2015 UWMPs identified seawater desalination as a strategic future supply option. Advancing this objective, the Water Authority executed a long-term Water Purchase Agreement (WPA) with Channelside Water Resources (Channelside) in November 2012. The WPA established the commercial and financial framework for the development and acquisition of desalinated seawater from the Carlsbad Desalination Plant. Construction of the facility commenced in 2012, with commercial operations beginning in December 2015. The plant is currently operational and

capable of producing a total of up to 56,000 AFY of potable water. Supplies generated from the Carlsbad Desalination Plant are classified as verifiable and reliable Water Authority supplies.

Table 4-1 provides an overview of the 2025 actual volumes of water from Water Authority supplies, described in detail in the sections below.

Table 4-1 Actual Water Supplies – Calendar Year 2025 Actual (AFY)

Water Supply	Additional Description	Water Type	2025 Volume	Total Entitlement[1]
Purchased or Imported Water	Water Authority–IID Transfer	Potable	200,000	200,000
Purchased or Imported Water	Coachella Canal Lining Project	Potable	21,500	21,500
Purchased or Imported Water	All-American Canal Lining Project	Potable	56,200	56,200
Purchased or Imported Water	Metropolitan Water District of Southern California	Potable	11,996	N/A
Other	Carlsbad Desalination Plant	Potable	32,998	50,000
Total Water Authority Supplies			**322,694**	**327,700**

[1] The Water Authority has a preferential right to 28.61% of Metropolitan's supplies (Metropolitan, 2025), which is sufficient to meet the Water Authority's need for supplemental supplies.

4.2 Imperial Irrigation District Conservation and Transfer

On April 29, 1998, the Water Authority signed a historic agreement with IID for the long-term transfer of conserved Colorado River water to the San Diego region. To date, the Transfer Agreement is the largest agriculture-to-urban conserved water transfer agreement executed in U.S. history, with up to 200,000 AFY transferred each year.

The conservation of Colorado River water was historically conducted by temporary farmland fallowing as a standard practice through 2016 to provide IID time to develop other conservation methods. Since 2016, water is conserved through both on-farm and system efficiency programs, funded by the Water Authority, and is then transferred to the San Diego region through the Colorado River Aqueduct, owned and operated by Metropolitan. On-farm conservation is a voluntary program where farmers agree to conserve water through such methods as sprinkler irrigation, drip irrigation and land reconfiguration. System efficiency projects are implemented by IID through capital improvement projects that conserve water by improving the efficiency of the IID distribution system. As part of the QSA and related agreements, conserved transfer water for the Water Authority falls under IID senior priority entitlement, which ranks higher than Metropolitan's Priority 4 supplies in California Colorado River apportionment. This separates the San Diego region from potential water transfer reductions during dry years in the Colorado River Basin.

4.2.1 Implementation Status

On October 10, 2003, the Water Authority and IID executed an amendment to the 1998 Transfer Agreement. This amendment modified certain aspects to be consistent with the terms and conditions of the 2003 QSA and other related agreements. Other aspects of the Transfer Agreement were modified to lessen environmental impacts. This amendment was expressly contingent on the approval and implementation of the QSA, which is detailed in Section 6.2.1, *Colorado River*.

As of the end of 2024, 2.2 million acre-feet of conserved water was generated in the IID service area and transferred to the Water Authority.

4.2.2 Expected Water Supply

The Water Authority receives conserved transfer water to the San Diego region each year according to the water delivery schedule included in the Transfer Agreement. The Transfer Agreement totals 200,000 AFY, but deliveries can be amended subject to optimizing resources to benefit the San Diego region and the Colorado River Basin each year for the duration of the Transfer Agreement. The initial term of the Transfer Agreement is 45 years, ending in 2047; however, a provision allows that either agency may request an additional 30-year term to extend the Transfer Agreement to 2077.

In 2023, the Water Authority reduced its scheduled delivery from 200,000 AF to 150,000 AF in exchange for federal funding, leaving 50,000 AF in the Colorado River to support federal conservation goals for the state in partnership with IID, Metropolitan, and USBR. In 2024, the Water Authority again reduced its scheduled delivery of 200,000 AF of QSA supplies to 150,000 AF in exchange for federal funding.

4.2.3 Transportation

The Water Authority entered into a water Exchange Agreement with MWD on November 10, 1998, to convey IID conserved transfer water from the Colorado River to the San Diego region. The Exchange Agreement was amended and restated as part of the QSA on October 10, 2003. Under that amended version, Metropolitan took delivery of both the IID conserved transfer water and the canal lining supplies from the lining of the All-American Canal and the Coachella Canal through its Colorado River Aqueduct (see Section 4.3, *All-American Canal and Coachella Canal Lining Projects*). In accordance with the Exchange Agreement, Metropolitan would deliver a like quantity and quality of water to the Water Authority. Per the 2003 amendment, the Water Authority agreed to pay Metropolitan at a rate comparable to other conveyance charges approved by the Metropolitan Board for its member agencies.

In 2017, the Water Authority Board approved an extension of the Exchange Agreement from 35 years to align with the 45-year timeframe of the Transfer Agreement with IID. In 2025, the Water Authority and Metropolitan entered into a settlement agreement, ending years of litigation over rates and the price term of the 2003 Exchange Agreement. This resulted in a second amended and restated 2025 Exchange Agreement, which will extend the agreement term to the same year that IID and the Water Authority agree to extend the Transfer Agreement (up to 2077), subject to the satisfaction of certain conditions.

Under the 2025 Exchange Agreement, exchange water is scheduled for delivery at both the Water Authority's and Metropolitan's operational convenience rather than by equal monthly installments, as was the default under the 2003 Exchange Agreement.

4.2.4 Cost/Financing

The costs associated with the conserved water transfer are financed through the Water Authority rates and charges. For calendar years 2016 through 2034, the Transfer Agreement 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 to settle a dispute regarding the application of the base contract price formula and required the Water Authority to prepay IID an additional $10 million for future deliveries of water, which IID repaid in full in 2018. Separately, the Water Authority paid IID $50 million in 2010 for capital expenses associated with creating conserved water from IID system conservation projects.

To address potential socioeconomic impacts in the Imperial Valley region stemming from the transfer of conserved water by IID to the Water Authority, both agencies agreed to fund a local entity in the Imperial Valley region to disburse socioeconomic impact payments. In May 2007, both parties executed a settlement agreement to resolve disputes related to the Water Authority payment of potential third-party socioeconomic impacts from the water transfer. The Water Authority agreed to pay $30 million to address potential impacts and IID, $20 million, for a total of $50 million. The Water Authority has completed payment of its share. IID share includes an annual reimbursement to the Water Authority and will complete payment in 2047.

As part of the implementation of the QSA and conserved water transfer, the Water Authority also entered into an environmental cost-sharing agreement and an agreement to create and fund the QSA Joint Powers Authority (JPA) to administer funding for mitigation projects. Under these agreements, the Water Authority made its final payment to the QSA JPA in July 2023. Between 2003 and 2025, the Water Authority contributed $90.8 million to fund environmental mitigation projects through the QSA JPA and has completed its $12 million obligation to the Salton Sea Restoration Fund.

The 2003 Exchange Agreement between Metropolitan and the Water Authority provided for transportation of IID conserved transfer water and the canal lining supplies through Metropolitan facilities. Under the 2003 Exchange Agreement, the initial price to transport the exchange water was set at $253/AF. Metropolitan published a transportation charge in 2025 of $622/AF. Under the 2025 Exchange Agreement, the price to transport the exchange water from 2026 through 2034 is fixed, with subsequent year pricing escalated in accordance with an annual Consumer Price Index based on national water and sewerage infrastructure costs.

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 Transfer Agreement.

4.2.6 Projected Water Supply

Based on the terms and conditions in the Transfer Agreement, Table 4-2 shows the anticipated delivery schedule for conserved transfer water in five-year increments. There is adequate

documentation to demonstrate the availability of this water supply; therefore, the water supply yields shown in Table 4-2 will be included in the reliability analysis found in Chapter 9, *Water Supply Reliability*.

Table 4-2 Projected Water Supply: Water Authority-IID Transfer (Normal Year, AFY)

2030	2035	2040	2045	2050 [1]
200,000	200,000	200,000	200,000	200,000

AFY = acre-feet per year; IID = Imperial Irrigation District

[1] Calendar Year 2050 supply assumes the IID conserved water transfer and out-of-region exchange agreements are extended.

4.3 All-American Canal and Coachella Canal Lining Projects

As part of the QSA and related contracts, specifically under the 2003 Allocation Agreement, the Water Authority contracted for 77,700 AFY of conserved water from projects that lined portions of the All-American Canal and Coachella Canal. The projects reduced the loss of water that occurred through ground seepage, and conserved water is delivered to the Water Authority. This conserved water will provide the San Diego region with an additional 8.5 million acre-feet (MAF) over the 110-year term of the 2003 Allocation Agreement.

4.3.1 Implementation Status

The Coachella Canal lining project constructed 35 miles of parallel, concrete-lined canal next to the original, unlined canal. Although construction was completed in 2006, deliveries of conserved water to the Water Authority began in 2007.

The All-American Canal lining project constructed 23 miles of parallel, concrete-lined canal adjacent to the original unlined canal and was completed in 2010 when deliveries of conserved water to the Water Authority began.

4.3.2 Expected Supply

The All-American Canal lining project can receive 67,700 AFY of Colorado River water available for allocation to the Water Authority and San Luis Rey Indian water rights settlement parties. The Coachella Canal lining project can receive 26,000 AFY of Colorado River water available for allocation. The 2003 Allocation Agreement provides for 16,000 AFY of conserved canal lining project water, from both projects, 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 Coachella Canal lining project. Under the existing agreements, annual canal lining supplies, for both projects, are delivered in equal monthly installments. Under the Allocation Agreement, IID may request portions of the water conserved through the canal lining projects in increments of 5,000 AF, provided specific conditions are met, including a determination by the Secretary of the Interior that the Colorado River is operating under surplus conditions.

4.3.3 Transportation

The 2025 Exchange Agreement between the Water Authority and Metropolitan provides for the delivery of the conserved water from the canal lining projects. Under the 2025 Exchange Agreement, Metropolitan takes delivery of both the IID conserved water transfer and canal lining supplies through its Colorado River Aqueduct and delivers to the Water Authority a like quantity and quality of water. The price to transport the exchange water from 2026 through 2034 is fixed, with subsequent year pricing escalated in accordance with an annual Consumer Price Index based on national water and sewerage infrastructure costs. In the 2025 Exchange Agreement, Metropolitan agreed to deliver the conserved canal lining water, for both projects, for the 110-year term duration of the Water Authority Allocation Agreement with the federal government and other parties.

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 received from Proposition 50, and $36 million was received from Proposition 84. The Water Authority was responsible for additional expenses above the funds provided by the state.

Additionally, the Water Authority funded a portion of the costs for the Coachella Mid-Canal Storage Project implemented in 2023, which modified a section of the canal to create storage capacity aimed at providing operational flexibility and reducing long-term repair costs.

In accordance with the Allocation Agreement, the Water Authority is responsible for a proportionate share of the additional net 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 rates and charges.

Transfer of water from the canal lining projects occurs via Metropolitan's water distribution system under the 2003 Exchange Agreement between Metropolitan and the Water Authority.

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 Projected Water Supplies

Table 4-3 shows the anticipated delivery schedule of conserved water supplies from the canal lining projects in five-year increments. Adequate documentation exists to demonstrate the availability of this water supply; therefore, the reliability analysis found in Chapter 9, *Water Supply Reliability*, will show the water supply yields presented in Table 4-3.

Table 4-3 Projected Water Supplies: Canal Lining Projects (Normal Year, AFY)

	2030	2035	2040	2045	2050
Coachella Canal Lining Project[a]	21,500	21,500	21,500	21,500	21,500
All-American Canal Lining Project[b]	56,200	56,200	56,200	56,200	56,200
Total:	**77,700**	**77,700**	**77,700**	**77,700**	**77,700**

AFY = acre-feet per year

[a] The project was completed in 2006 and deliveries started in 2007.

[b] The project was completed and deliveries started in 2010.

4.4 Metropolitan Water District of Southern California

The Water Authority imported water supply sources include purchases from Metropolitan. This is separate from and in addition to the Water Authority-IID transfer supplies and Coachella Canal and All-American Canal lining supplies. Chapter 6*, Metropolitan Water District of Southern California,* contains detailed information about Metropolitan supplies. Information about Water Authority projected demands on Metropolitan, as provided by Metropolitan, can be found in Appendix G.

4.5 Carlsbad Desalination Plant

Desalination of seawater in the San Diego region is an important component of diversifying the region's water resource portfolio by reducing dependence on imported water supplies and provides a locally treated, drought-proof water supply. The Carlsbad Desalination Plant is managed by Channelside and consists of a desalination plant and associated conveyance pipeline. The plant began operations on December 23, 2015, supplying up to 56,000 AFY for the San Diego region. Of the total Carlsbad Desalination Plant production, 6,000 AFY is considered a member agency local supply, as further detailed in Section 5.6.1, *Carlsbad Desalination Plant*.

Following the Encina Power Station decommissioning and termination of the once-through cooling water system, the Carlsbad Desalination Plant has transitioned from co-located operations with the power station to permanent stand-alone operations. Recent modifications to intake and discharge operations include a direct lagoon intake and fish-friendly pumps, as well as the implementation of new one-millimeter intake screens. Additionally, there is the potential to increase annual average production capacity to 61,600 AFY as an adaptive management supply, subject to future supply conditions and Water Authority Board approval.

Each year, the Water Authority and Channelside establish an estimated schedule of water deliveries from the Carlsbad Desalination Plant. These schedules account for variability in Water Authority demands (e.g., lower water demand in winter months) and planned maintenance at both the plant and Water Authority facilities.

4.5.1 Transportation and Energy

A 54-inch diameter pipeline conveys produced water from the plant 10 miles east to the Water Authority Second Aqueduct. The water is then conveyed 5 miles north to the Water Authority Twin Oaks Valley WTP, where it is blended with treated imported water and subsequently distributed to the Water Authority Aqueduct System.

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

4.5.2 Cost/Financing

The Water Purchase Agreement between the Water Authority and Channelside defines the terms under which the Water Authority purchases all water produced from the Carlsbad Desalination Plant. For contract year 2024 through 2025, the price was $3,570 per AF, including conveyance pipeline debt service and Channelside management fee. The Water Authority water purchase costs are recovered through member agency 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 Projected Water Supplies

Table 4-4 shows the amount of desalinated water (AFY) supplied from the Carlsbad Desalination Plant in one-year increments from 2021 through 2025.

Table 4-4 Water Supply from Carlsbad Desalination Plant A (AFY - calendar year)[a]

Desalination Facility	Plant Capacity	Intake Type	Source Water Type	Influent TDS	Brine Discharge	2021	2022	2023	2024	2025
Carlsbad Desalination Plant	56,000	Open water (lagoon)	Sea water	34,500[b]	Ocean discharge	44,470	40,779	40,097	17,163	32,998

AFY = acre-feet per year; TDS = total dissolved solids

[a] Excludes local supplies for Vallecitos Water District (3,500 AFY) and Carlsbad Municipal Water District (2,500 AFY).

[b] Mean of yearly average TDS values from 2021 to 2025.

Table 4-5 shows the anticipated delivery schedule of water supplies from the Carlsbad Desalination Plant in five-year increments. Adequate documentation exists to demonstrate the availability of this water supply; therefore, the reliability analysis found in Chapter 9, *Water Supply Reliability*, will show the water supply yields presented in Table 4-5.

Table 4-5 Projected Water Supply: Carlsbad Desalination Plant (Normal Year, AFY)

2030	2035	2040	2045	2050
42,000	42,000	42,000	42,000	42,000

4.6 Water Authority Dry-Year Water Supplies

In addition to Water Authority water supplies anticipated during a normal water year, the Water Authority has invested in carryover storage to enhance reliability during dry years and multiple dry years, as discussed in Section 9.3, Dry Water Year Assessment. The carryover storage program consists of in-region surface water storage. This verifiable dry-year storage water supply is detailed in Chapter 11, Water Shortage and Drought Planning. A list of the written contracts, agreements, and environmental permits associated with implementation of the Carryover Storage Program is provided in Appendix D.

4.7 References

Metropolitan Water District of Southern California (Metropolitan). 2025. DRAFT Urban Water Management Plan. Available: https://d1q0afiq12ywwq.cloudfront.net/media/5ralzxit/public-review-draft-february-2026-uwmp.pdf. Accessed April 2026.

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Chapter 5: Member Agency Supplies

5.1 Introduction

This Chapter provides an overview of the local water supplies that support the San Diego region's water portfolio. These resources include surface water, groundwater, recycled water, potable reuse, desalinated seawater, and water transfers — all of which contribute to a more sustainable and adaptable water supply system. Local water supply development by member agencies reduces reliance on imported water supplies and enhances system flexibility to manage available resources.

For the purpose of analysis as presented in the 2025 UWMP, supplies are separated into three project categories, each of which is described below: verifiable, additional planned, or conceptual.

- **Verifiable projects** – projects with substantial evidence and adequate documentation regarding implementation and supply use. The Water Authority and its 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, issued permits or signed construction contracts. Verifiable supplies are included in water supply assessments and verifications prepared by retail water agencies and used by cities and San Diego 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 reliability assessment discussed in Chapter 9, *Water Supply Reliability*.
- **Additional planned projects** – are projects the Water Authority or member agencies are actively pursuing and currently funding, but do not rise to the level of verifiable for implementation. Additional planned projects may include projects the member agencies have studied for feasibility and continue to fund advanced planning efforts.
- **Conceptual projects** – are projects considered to be in pre-planning and pre-feasibility analysis phases, where the projects have not progressed to the point where the project yield can be factored into reliability assessments or uncertainty planning for this 2025 UWMP.

5.1.1 Background

Prior to 1947, the San Diego region depended primarily on local surface water runoff during normal and wet years and on groundwater pumped from local aquifers during dry periods when streamflows were reduced. As population and economic growth accelerated, these local resources proved insufficient to meet the region's increasing water demands. Beginning in the 1950s, the region became increasingly reliant on imported water supplies to support continued growth and development.

Since 1980, local water sources have contributed between 5% and 36% of the total water used within the Water Authority's service area, with the majority historically derived from surface water reservoirs whose yields fluctuate with annual rainfall. Over time, a growing share of local supply has been developed from recycled water, groundwater recovery, potable reuse, and seawater desalination, sources that are considered drought-resilient because they are largely independent of precipitation.

Local water supplies also include water transfers, such as those implemented through the San Luis Rey Water Transfer. In fiscal year 2025, local sources collectively provided approximately 33% of the total water used within the Water Authority's service area.

Local water resources developed and managed by the Water Authority's member agencies play a vital role in maintaining a diverse and reliable regional water supply. By reducing dependence on imported water, these projects strengthen drought resilience and enhance long-term supply reliability. The Water Authority, working closely with its member agencies, took the following steps to update yields anticipated by member agencies' local water supplies:

1. Provided draft water supply projections developed for the Water Authority's 2025 UWMP to member agencies and asked member agencies to review and respond with any revisions needed to reflect actual conditions, such as new or revised projects or associated supply projections. The member agencies were also asked to categorize their projects as verifiable, additional planned, or conceptual, based on the stages of development
2. Prepared revised water supply projections based on input from member agencies.
3. Presented the revised water supply projections, with input from member agencies incorporated, and continued working with member agencies to develop the water supply projections so they accurately reflect member agency project implementation efforts.
4. Distributed the Administrative Draft 2025 UWMP to member agencies for review, collected input from member agencies regarding their local water supply figures, and incorporated any necessary revisions in coordination with member agencies prior to submittal to the Water Authority Board for consideration of approval.

5.2 Surface Water Supply

The San Diego region's surface water yield is supported by 21 reservoirs with a combined capacity of about 719,000 AF. See Table 5-1, which lists the 21 reservoirs with their associated operating agency, and water storage capacity, and Figure 5-1, which shows reservoir locations across seven of San Diego County's nine coastal watersheds. Runoff in these watersheds begins at the crest of the San Diego County Peninsular Range and drains into the Pacific Ocean. The oldest of these reservoirs, Cuyamaca, was constructed in 1887.

Olivenhain Reservoir, completed in 2003, is the newest reservoir in the San Diego area and part of the Water Authority's Emergency Storage Project (ESP), which protects the San Diego region from disruptions of imported water from Metropolitan.

The Water Authority's *2002 Regional Water Facilities Master Plan* identified an opportunity to augment the ESP with a carryover storage component at San Vicente Reservoir. This led to the San Vicente Dam Raise, completed in mid-2014, which added 152,100 AF of combined emergency and carryover 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 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
Helix Water District	Cuyamaca	8,195
🔥 Helix Water District	Jennings	9,790
🔥 Poway, City of	Poway	3,432
🔥 Ramona Municipal Water District	Ramona	12,000
San Diego, City of	Barrett	34,806
🔥 San Diego, City of	El Capitan[b]	50,732
🔥 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[b]	16,742
🔥 San Diego, City of	Murray[b]	3,884
🔥 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
Vista Irrigation District	Henshaw[d]	51,774
Total Capacity		**719,323**

🔥 = Connected to Water Authority aqueduct system.

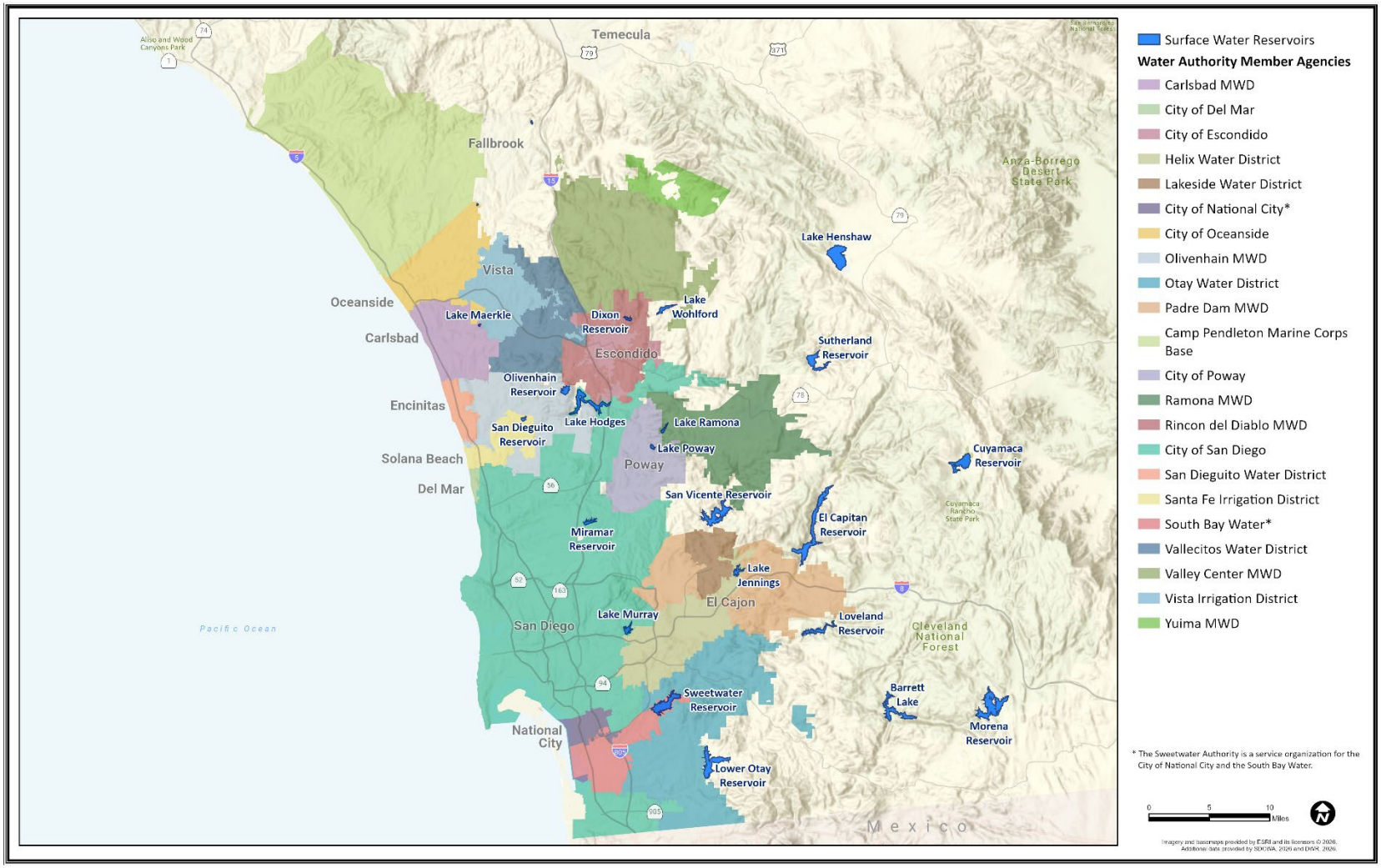
[a] The Wohlford Reservoir capacity accounts for lowered water level at Lake Wohlford from restrictions enforced by the Department of Water Resources (DWR) Division of Safety of Dams (DSOD).

[b] Reservoir capacity accounts for lowered water level from DWR DSOD restrictions.

[c] The Water Authority has storage rights to 157,100 AF of capacity in San Vicente Reservoir 100,000 AF is designated as carryover storage, 52,100 AF is designated as emergency storage, and the remainder is operational storage.

[d] Henshaw Reservoir is formed by Henshaw Dam on the San Luis Rey River. It contains surface water runoff and groundwater pumped from the Warner Valley Groundwater Basin by the City of Escondido and Vista Irrigation District.

Figure 5-1 Major San Diego County Reservoirs



5.2.1 Surface Water Management

The Water Authority member agencies manage most of the reservoirs in the San Diego region. The San Vicente Dam Raise was completed in mid-2014 and 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 and member agencies manage the imported conveyance system to achieve optimal use of local and imported water resources. To reduce the need for imported water purchases, reservoirs are operated to maximize the use of local supply.

Local surface water supplies are managed to offset dry-year shortfalls in imported water. 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 2025 (Water Authority, 2025). Water storage agreements allow for carryover water storage to be placed in member agency reservoirs to provide increased local water storage capacity, which can be used during peak demand periods. The *Aqueduct Operating Plan* coordinates imported water deliveries and optimizes reservoir fill opportunities. Local yield is maximized by the member agencies that operate the reservoirs.

5.2.2 Projected Surface Water Supplies

Surface water supplies can represent the largest single local resource in the Water Authority service area. However, annual surface water yields can vary substantially due to fluctuating hydrologic cycles. Since 1980, annual surface water yields have ranged from a low of 4,100 AF in FY 2015 to a high of 140,300 AF in FY 1984. The projected average annual surface water use among Water Authority member agencies is expected to increase slightly, from 42,439 AF in 2030 to 47,740 AF in 2050.

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

Member agencies expect to include specific information on the projected yields from local reservoirs in their respective 2025 UWMPs.

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

2025	2030	2035	2040	2045	2050
66,964	42,439	46,056	47,740	47,740	47,740

5.3 Groundwater Supply

Groundwater accounts for a small percentage of the water supply portfolio in the San Diego region. However, it remains an important resource contributing to reducing the San Diego region's future imported water demands.

The Water Authority provides financial and technical assistance to member agencies that are evaluating, planning, and implementing groundwater recovery projects. While South Bay Water, which is the governance branch of Sweetwater Authority, relies on their groundwater basins for a

large portion of their water supply, other member agencies such as Olivenhain Municipal Water District continue to study the potential for brackish groundwater recovery and treatment in their service areas.

5.3.1 Groundwater Supply Description

This section describes municipal groundwater development in the Water Authority's service area, as well as regulatory requirements associated with groundwater production, and projected member agency yields. Within the past five years, water agencies in the Water Authority's service area have utilized an average of approximately 26,700 AFY of potable water supplies from groundwater or about 7% of the region's total water supply. 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 groundwater wells used for irrigation and domestic purposes, or several thousand AFY of groundwater produced from the Warner Valley Groundwater Basin (Warner Basin) by the Vista Irrigation District.[1] Groundwater pumped from the Warner Basin is discharged into Lake Henshaw and reported as local surface water supply by the City of Escondido and Vista Irrigation District. Specific information required under the UWMP Act on groundwater basins and member agency projects is expected to be included in member agency 2025 UWMPs.

In addition to providing a local water 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. For example, in the vicinity of the unincorporated community of Ramona in the north-central portion of San Diego County, over 1,000 privately owned wells provide a supplementary source of water for Ramona Municipal Water District (Ramona MWD) customers. Efforts are underway to connect some residents relying on groundwater wells to municipal water supplies in Ramona. Led by Ramona MWD, these efforts aim to provide a more stable, reliable and drinkable water supply to area residents upon completion and will help improve groundwater quality by reducing the return of nitrates and salts from septic systems to the local aquifer. Similar domestic uses occur throughout the Water Authority 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 service area. One agency, Yuima Municipal Water District (Yuima MWD), began reporting yield in 2015 from several mutual water companies within its service area, totaling approximately 6,000 AFY.

Groundwater production in the Water Authority service area is limited by a few factors, including constrained geographic extent of more productive alluvial aquifers, relatively shallow alluvial aquifers, lack of rainfall and groundwater recharge, and degraded water quality resulting from human activities such as septic tank use.

[1] The Warner Basin is a 24,000-acre groundwater basin bounded by Lake Henshaw on the west and the crystalline rocks of the Peninsular Ranges on other sides. It is recharged by infiltration of precipitation and surface water runoff from Agua Caliente Creek, Buena Vista Creek, and the San Luis Rey River, which flows into Lake Henshaw. (DWR 2004)

Shallow and narrow river valleys filled with alluvial sand and gravel deposits are characteristic of more productive groundwater basins in the San Diego region. Outside of these productive aquifers, groundwater is developed from fractured crystalline bedrock and semi-consolidated sedimentary deposits that occur throughout the San Diego 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 service area and identifies the DWR-designated priority level for each.

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 basins in the Central Valley, sufficient undeveloped brackish groundwater supplies exist that could provide a new supply in the San Diego region. Several agencies in the Water Authority service area have identified potential projects that may provide several thousand AFY of additional groundwater production in the coming years and are summarized below.

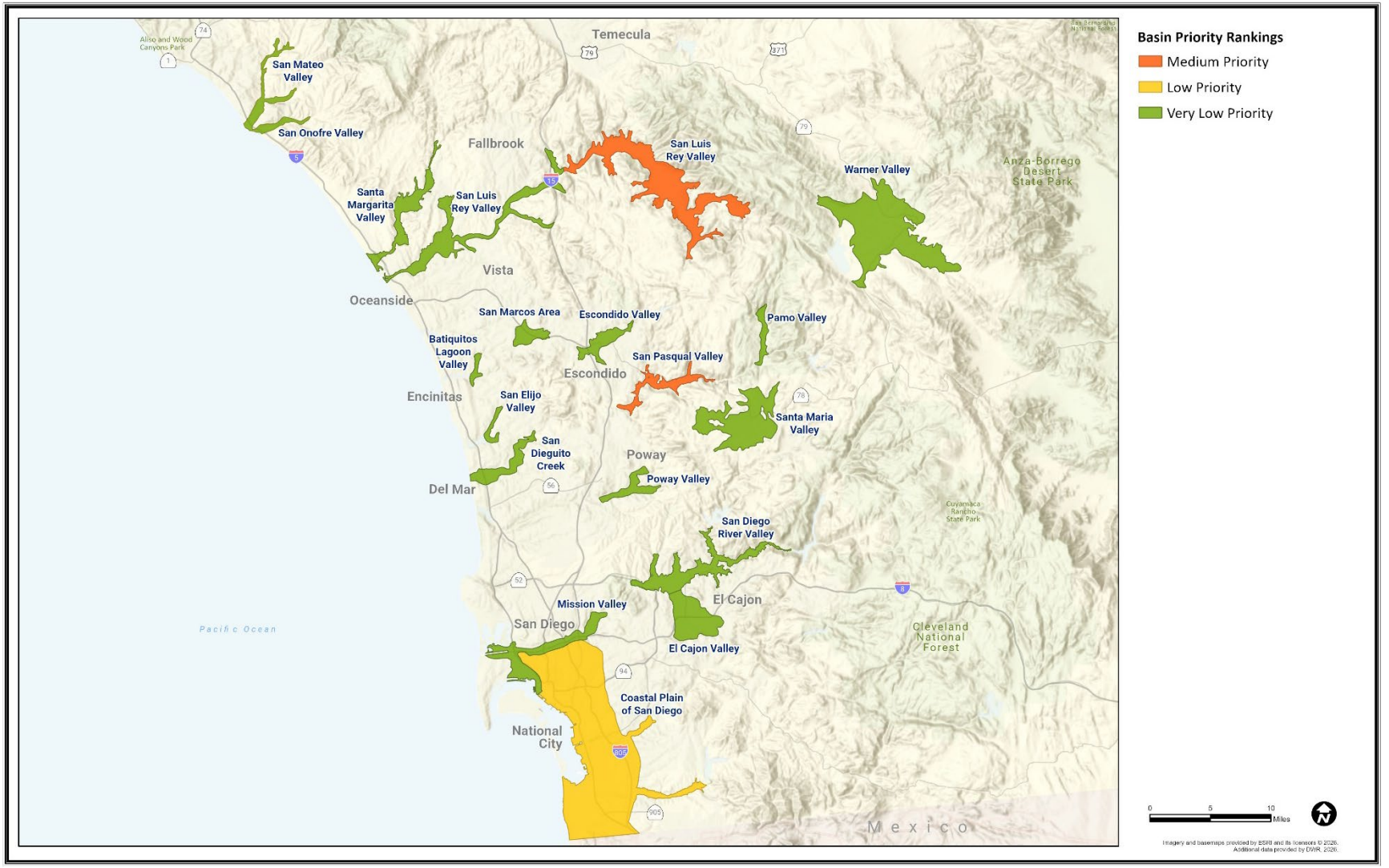
Groundwater Extraction and Disinfection Projects

Groundwater extracted from wells and used as a potable water supply with disinfection generally occurs in the upper reaches of the San Diego region's east-west trending watersheds. Wells producing higher-quality water are operated by MCB Camp Pendleton (Santa Margarita River watershed) and the Sweetwater Authority (San Diego Formation aquifer). Vista Irrigation District also operates 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 downstream for use in areas such as the City of Escondido. The unit cost of water produced from simple groundwater extraction and disinfection projects is low and generally well below the cost of imported water. A substantial amount of higher-quality groundwater in the Water Authority's service area is prioritized for use by member agencies and future local groundwater development is focused on developing brackish groundwater recovery and recharge projects.

Brackish Groundwater Recovery Projects

Groundwater high in salts, TDS, and other contaminants which require advanced treatment prior to potable use are typically found in shallow basins located in downstream watersheds. Brackish groundwater recovery projects use membrane technology, such as reverse osmosis, to treat extracted groundwater to potable water standards. Two brackish groundwater recovery and treatment facilities in the Water Authority's service area are the City of Oceanside 6.4-MGD capacity Mission Basin Desalter and the Sweetwater Authority 10-MGD Richard A. Reynolds Groundwater Desalination Facility. Several member agencies are considering the feasibility of new groundwater recovery and treatment facilities. Unit costs for brackish groundwater recovery projects are considerably higher than those for standard groundwater extraction and disinfection projects due to the additional treatment requirements and cost of concentrate brine disposal. Where economical options exist for disposal of brine, this type of groundwater project has proven to be an economically sound water supply option.

Figure 5-2 Alluvial Groundwater Basins



Groundwater Recharge and Recovery Projects

Artificial recharge and recovery projects (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 of these sources can be used to recharge groundwater basins when water levels have been lowered sufficiently by groundwater pumping activities. Groundwater basins can be operated similarly to surface water reservoirs by supplying stored water if imported water deliveries are limited due to high demand, supply and facility constraints, or a combination thereof. An example of a groundwater recharge project is the City of Oceanside Pure Water program. Phase I of this project will recharge up to 3,360 AFY of advanced treated water into the Mission Basin Aquifer. Pumped groundwater will be treated at the existing Mission Groundwater Purification Facility to supplement the potable water supply for the City of Oceanside. More information about the Pure Water Oceanside project is available in Section 5.5, *Potable Reuse 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. This includes hydrogeological uncertainties, high costs of studies and subsurface investigations, higher unit costs associated with brackish groundwater recovery and treatment, project funding considerations, water rights, regulatory and environmental concerns, and potential contamination of groundwater that may occur after the project is constructed and operational. These issues have discouraged decisionmakers, limiting groundwater development in San Diego County in the past; however, more frequent state-wide drought conditions and water supply reliability concerns have prompted renewed consideration of the viability of local groundwater development and contamination cleanup projects.

Hydrogeological and Environmental Impact Uncertainty

Significant resources must be expended prior to determining the feasibility of a groundwater project in basins unfamiliar with groundwater as a source of a municipal water supply. These uncertainties include minimal information regarding issues such as the nature of aquifer materials, the number of existing wells and groundwater production, water quality, and potential impact of pumping implications on riparian habitats. 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 of aquifers and watersheds. These issues, in conjunction with financial considerations, often dictate how groundwater projects are developed, and how production increases incrementally.

Economic and Financial Considerations

Because of the saline nature of water and presence of other contaminants in many groundwater basins in San Diego 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 impact groundwater project development. Water 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 development of these projects can involve multiple water agencies, private well owners and water rights holders. Recent drought conditions have prompted local agencies to attempt to resolve or overcome barriers to groundwater development and proceed with planning and implementing groundwater projects.

Environmental Regulatory Constraints

Environmental impacts associated with fluctuations in groundwater levels due to large-scale groundwater extraction are a concern for many proposed groundwater projects in the Water Authority's service area. Large extractions could impact endangered species habitat and groundwater-dependent vegetation, particularly for projects that cause seasonal or long-term declines in groundwater levels. Although potential environmental impacts can generally be mitigated, mitigation costs can reduce the cost-effectiveness of a groundwater project.

Water Quality

Remediation of groundwater contamination involves significant, ongoing operations and maintenance costs that present barriers to project implementation. See Section 7.5, *Groundwater*, for additional information about water quality for groundwater supplies.

5.3.3 Funding

Groundwater projects in the San Diego region have received financial support from state, federal, and local funding sources. State funding has been made available through DWR via the IRWM and Sustainable Groundwater Management Act (SGMA) implementation grant programs. The SWRCB administers low-interest loans and grants through the Drinking Water State Revolving Fund and Clean Water State Revolving Fund (CWSRF) that can be used for groundwater infrastructure and water quality projects. At the federal level, the United States Bureau of Reclamation provides cost-sharing opportunities through programs such as the WaterSMART and Drought Response programs, which support groundwater recharge and storage projects.

Since 2020, approximately $15 million in grant funding has been awarded through the San Diego IRWM program for several groundwater projects in the San Diego region. Funded projects include the following:

- Paradise Valley Creek Water Quality and Community Enhancement Project – reduces flood risks and improves water quality through creek improvements, stormwater capture, and infiltration.
- Pure Water Oceanside Project – recharges advanced treated water into the Lower San Luis Rey Groundwater Basin (Mission Basin) through construction of injection wells and conveyance pipelines.
- Acres Water Consolidation Project – Phase 1, Parts 1 and 2 reduce reliance on private groundwater wells and improves water reliability by providing direct water and sewer connections to Ramona MWD.

- Federal Boulevard De-channelization and Habitat Restoration Project – restores a creek to improve flood capacity, enhance groundwater recharge through stormwater capture, and re-establish native habitat.
- Ramona/Barona Recycled Water Pipeline Project – installs a recycled water pipeline from the San Vicente Water Reclamation Plant to the Barona Reservation, providing recycled water for irrigation and other non-potable uses and reducing groundwater pumping, improving groundwater levels, storage, and water quality.

Chapter 8, *Integrated Regional Water Management Planning*, of this UWMP describes the IRWM program in more detail.

In 2024, California voters approved Proposition 4 (Prop 4), authorizing $10 billion in general obligation bonds for water, wildfire prevention, and climate resilience. Prop 4 will dedicate $3.8 billion for safe drinking water, drought preparedness, flood protection, and water resilience programs. From that allocation, $386 million is expected to support projects involving groundwater storage, banking, recharge, or instream flow projects that support the conjunctive use of groundwater and surface water. Additionally, $25 million is reserved for projects that provide direct benefits to tribal communities. Prop 4 will provide possible future funding opportunities for groundwater projects in San Diego County.

5.3.4 Sustainable Groundwater Management Act

In 2014, the California Legislature passed SGMA to address long-term groundwater sustainability issues throughout the state. SGMA provides local agencies with a planning framework for managing groundwater basins in a manner that ensures basin sustainability by 2040, recognizing groundwater is most effectively managed at the local level. Other goals of SGMA include the following:

- Establish standards for sustainable groundwater management
- Improve coordination between land use and groundwater planning
- Provide technical assistance
- Create a mechanism for state intervention if groundwater is not managed sustainably within a basin

DWR's *Bulletin 118 Interim Update 2025, California's Groundwater—Working Toward Sustainability,* identified 515 alluvial groundwater basins in California (DWR, 2025). DWR prioritized all basins into four categories: high, medium, low, or very low. Figure 5-2 identifies the DWR-designated SGMA priority levels for all groundwater basins in the Water Authority service area.

SGMA requires medium- and high- priority basins to be managed by Groundwater Sustainability Agencies (GSAs) for long-term sustainability. A GSA may be a local agency, a combination of local agencies, or a county. SGMA requires GSAs to develop a Groundwater Sustainability Plan (GSP) for their respective basins and provide a locally directed roadmap for achieving long-term sustainable groundwater conditions by 2040. There are two basins in San Diego County that currently require management under SGMA, including:

- San Luis Rey Valley (medium priority) is managed by the Upper San Luis Rey Groundwater Management Authority GSA comprised of Pauma Municipal Water District, Pauma Valley Community Services District, San Luis Rey Municipal Water District, Yuima Municipal Water District, and Upper San Luis Rey Resource Conservation District.
- San Pasqual Valley (medium priority) is managed by the San Pasqual Valley GSA comprised of the City of San Diego and County of San Diego.

The GSPs and associated Annual Reports for the basins listed above are available for review on DWR's SGMA Portal (https://sgma.water.ca.gov/portal/). In addition to the San Luis Rey Valley and San Pasqual Valley basins, the Borrego Valley Groundwater Basin (high priority), managed by the Borrego Water District and County of San Diego, was previously subject to SGMA management but became adjudicated in July 2020, when the San Diego County Superior Court approved a notice of commencement of groundwater adjudication. Due to adjudication, the Borrego Valley basin is no longer required to be managed under a GSP, as the adjudication serves as the governing management framework.

5.3.5 Projected Groundwater Supply Yield

The Water Authority 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 projections are included in the reliability analysis found in Chapter 9, *Water Supply Reliability*. Appendix F (Table F-2) lists the projects and their projected supplies.

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

2025	2030	2035	2040	2045	2050
30,009	30,260	29,900	29,900	26,400	26,400

Beginning in 2025, an overall increase in groundwater production is projected due primarily to increased production from the City of Oceanside Mission Basin Groundwater Purification Facility through 2040. After 2040, projected groundwater production is planned to decrease to align with sustainability and pumping limitations established in approved GSPs.

Additional Planned Projects—Groundwater

Maximizing groundwater development can help to further diversify the San Diego region's water supply portfolio. Beyond the projections of more reliable and verifiable projects included in Table 5-3, member agencies have identified two additional planned groundwater projects, with an estimated total of 3,175 AFY of additional yield in 2050. Olivenhain Municipal Water District has initiated the San Dieguito Valley Brackish Groundwater Desalination Project which anticipates groundwater production of 1,600 AFY by 2050, and the Sweetwater Authority has initiated the Indirect Potable Reuse (IPR) Groundwater Recharge Project that is expected to yield 1,875 AFY by 2050, if implemented. Additional planned projects, as well as the conceptual projects provided by the member agencies, are included in Appendix F, *Member Agency Local Supply Projections*.

5.4 Recycled Water Supply

For decades in San Diego County, recycled water has been a growing water resource and continues to expand as a reliable drought-resilient water supply that reduces dependence on imported water. Of the 22 member agencies in the Water Authority, 15 have developed recycled water supplies for their retail customers and production is anticipated to reach 40,223 AF annually by 2050. While the Water Authority does not produce recycled water, the use of recycled water is supported by the Water Authority through administering grant-funded recycled water projects, facilitating information sharing and partnerships among member agencies, offering technical support, and providing regulatory and policy advocacy.

Water recycling in the San Diego region began in the 1960s when Padre Dam Municipal Water District began recycling water for use in Santee Lakes, and expanded significantly in the 1990s as additional reuse projects came online. Additional details on agency-specific existing sources or future recycled water projects may be found in the 2025 UWMPs for those agencies. The Water Authority prepared this section in coordination with its member agencies and wastewater agencies operating recycled water facilities in the Water Authority service area.

5.4.1 Recycled Water Description

This section addresses non-potable recycled water, which involves treating and disinfecting municipal wastewater to produce a water supply suitable for non-drinking uses.

Water recycling in the San Diego region began in the 1960s when Padre Dam Municipal Water District began recycling water for use in Santee Lakes and increased in use starting in the 1990s. Today, agencies in San Diego County use recycled water to fill lakes, ponds, and ornamental fountains, 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 such as cooling towers, street sweeping and firefighting, and provided for use in toilets and urinals in non-residential buildings.

Local agencies must consider several factors when developing recycled water projects, including economic and financial considerations, regulatory requirements, regional coordination, and public support. These factors can limit the amount of recycled water used in San Diego County if unresolved. The following sections discuss 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*.

5.4.2 Recycled Water Issues

Economic and Financial Considerations

The capital-intensive cost of constructing recycled water infrastructure and managing a dual distribution system has historically been a barrier to project development. 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 several years, resulting in very high initial unit costs that impact cash flow in early project years. Some local agencies, such as Otay Water

District, Carlsbad Municipal Water District, and the City of San Diego, have been successful in expanding recycled water by requiring developers to install dual-plumbed systems as new development infrastructure is built.

The high costs associated with converting existing water customers to non-potable recycled water use is another challenge compounded by the seasonal nature of recycled water demands, a lack of seasonal storage, and the lack of large industrial water users that can use recycled water in San Diego County. Projects that primarily serve irrigation demands, which are most of the projects in the Water Authority service area, often cannot use their full 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 project facilities must be sized to accommodate seasonal peaking. Additionally, projects that serve irrigation customers tend to have less stable revenue bases because irrigation demands are heavily influenced by hydrologic conditions.

Availability of seasonal and operational storage can support continuous demand and production of recycled water throughout the year, resulting in more cost-effective projects. To be economically feasible, project benefits must offset or exceed 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 Requirements

The SWRCB Division of Drinking Water (DDW) and the nine Regional Water Quality Control Boards (RWQCBs) are the state agencies responsible for regulating the application and use of recycled water. Planning and implementing recycled water projects requires interactions with these regulatory agencies prior to project approval.

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

The San Diego RWQCB is responsible for issuing permits and enforcing requirements of the application and use of recycled water for compliance with objectives of the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) and incorporates recommendations from DDW (San Diego RWQCB, 1994). As part of the permit application process, applicants must demonstrate that the proposed recycled water operation will meet ground and surface water quality objectives in the Basin Plan and comply with Title 22 requirements. With 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 and Quality (DEHQ). Under a delegation agreement with the California Department of Public Health, the DEHQ 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.

Effective coordination and consistent application of regulations among regulatory agencies responsible for monitoring the development of recycled water is critical for project proponents to satisfy regulations and develop cost-effective recycled water 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 partnerships with industry associations such as the WateReuse 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 recycled water priorities are considered in the development of recycled water policy and regulations in the San Diego region.

The *Policy for Water Quality Control for Recycled Water* (Recycled Water Policy) 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 (SWRCB, 2018). The Recycled Water Policy was updated by the SWRCB in 2013 and in 2018. Water Authority staff advocated throughout the SWRCB public process for reasonable regulations that support local projects while protecting public health and the environment by coordinating with member agencies to analyze proposed policy changes, meeting with SWRCB staff, developing comment letters, and providing 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 recycled water
- 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

In August 2022, California Governor Gavin Newsom released *California's Water Supply Strategy (WSS) - Adapting to a Hotter Drier Future*, which identifies several priority actions to protect water supplies from the impacts of climate change (SWRCB, 2022). The WSS calls for a comprehensive approach to developing new sources of water supply including recycled water. The strategy sets new numeric targets for recycled water production, calls for substantial investments to support project development and implementation, and establishes a dedicated strike team to address permitting and funding obstacles that have historically slowed project delivery. Together, these measures are intended to accelerate the expansion of recycled water and strengthen long-term water resilience in the state.

Institutional

Interagency coordination between a wastewater agency producing recycled water that is separate from the water purveyor providing recycled water can be a challenge for the development of recycled water projects in San Diego County. Effective communication and cooperation early in the process between both agencies regarding distribution of recycled water is essential to providing service to water customers.

Organization for distribution of recycled water between agencies and water purveyors requires contracts or agreements which typically define reporting and compliance responsibilities, amount of recycled water deliveries, water pricing, and a financing plan identifying which agency will receive financial incentives. 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 relationships support the advancement of recycled water use in the San Diego region.

Public Acceptance

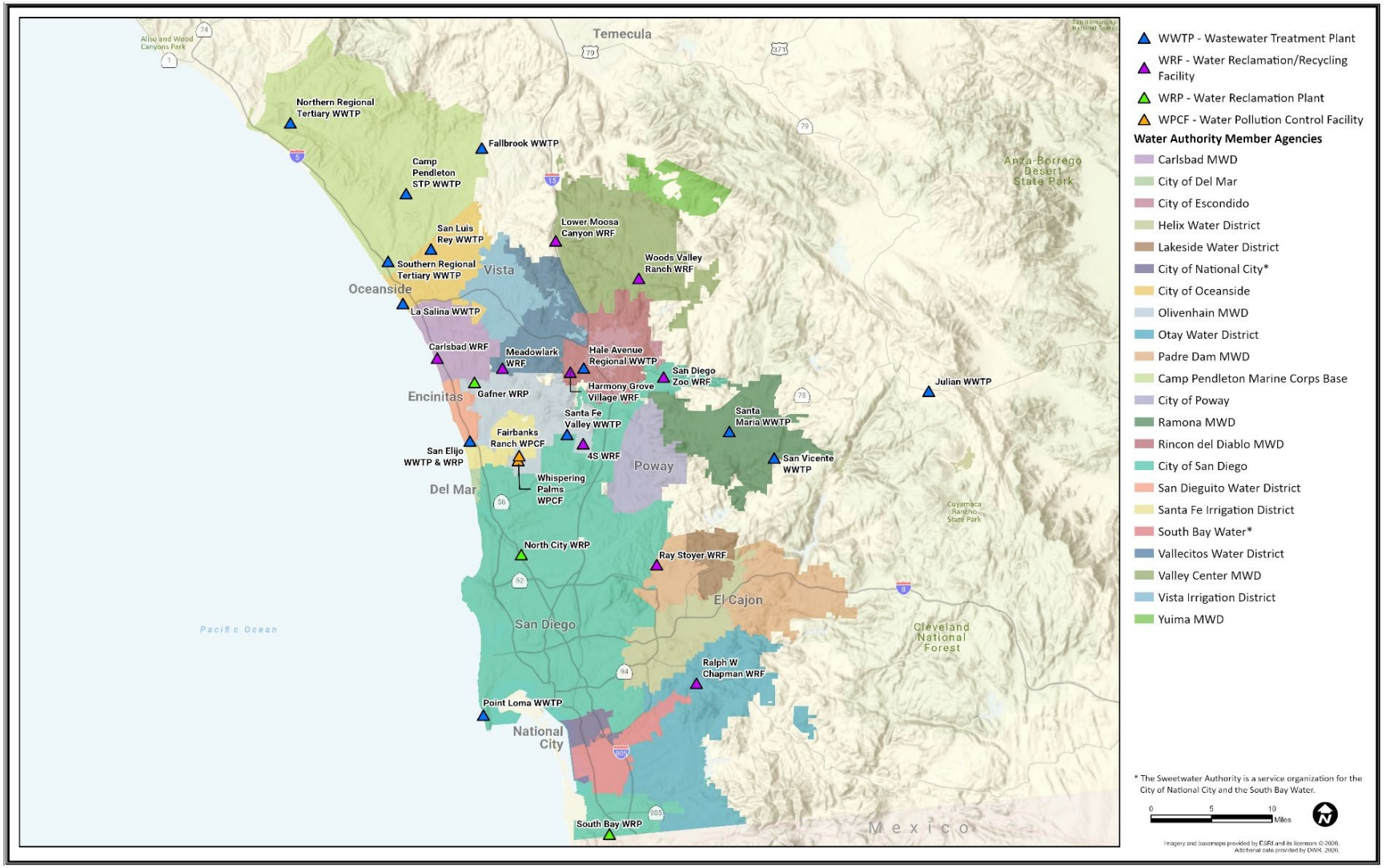
Public acceptance of recycled water projects is critical to successful siting, financing, constructing, and operating. Concerns from the public about general water quality and safety are often due to a lack of understanding regarding recycled water treatment processes. To obtain public acceptance, education and involvement have been identified as a successful outcome for project support.

The Water Authority engages residents in recycled water through community outreach and social media and also conducts periodic surveys to gather information on public perception of recycled water. Support for recycled water has grown over the years due to education efforts that highlight its benefits and demonstrate the effectiveness of the treatment process.

5.4.3 Wastewater Generation, Collection, Treatment, and Disposal

Multiple Water Authority member agencies provide wastewater collection, treatment, and disposal services. Approximately 200 million gallons per day of wastewater is currently generated, collected, treated, and disposed of within the Water Authority service area and provides 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 highly urbanized areas in the San Diego region. Figure 5-3 shows the location of wastewater treatment plants and associated outfall systems in San Diego County (both within and outside of the Water Authority service area). The coastal location of the plants is not always conducive to recycled water development. Most recycled water demand is located at higher elevations, making distribution systems costly. However, recycled water costs can be offset by possible savings on wastewater treatment costs. Appendix F (Table F-3) shows a list of wastewater treatment plants, their capacities at various levels of treatment, and the type of disposal in San Diego County. 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 5-3 Wastewater Treatment and Water Recycling Facilities



Note: Ray Stoyer Water Reclamation Facility (WRF) was taken offline in October 2025; see Section 5.5.1, *Potable Reuse Background and Description*.

5.4.4 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.

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

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

Collectively, these programs support all project phases from initial planning and design through construction and operation. In fiscal year 2025, programs administered by the Water Authority and Metropolitan provided about $1.4 million to San Diego County agencies.

Local Water Supply Development Program

The Water Authority administers the Local Water Supply Development (LWSD) Program, which is designed to ensure the financial feasibility of local recycled water projects during their initial years of operation and to incentivize recycled water development in the Water Authority service area. The Water Authority stopped accepting new projects under this program in 2010, and incentives for the remaining agreements will end in 2035. The Water Authority has entered into Local Water Supply Development Program agreements with 13 water and wastewater agencies for a combined project yield of 45,000 AFY. Over $62 million in Water Authority incentive funding has been awarded to program participants. In fiscal year 2025, the Water Authority provided local agencies with nearly $500,000 in Local Water Supply Development Program incentives for agencies with existing executed agreements for recycled water projects.

Metropolitan Local Resources Program

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

United States Bureau of Reclamation Title XVI Grant Program

Since 1995, the USBR Title XVI Grant Program has been a significant source of funding for recycled water projects in the San Diego region. 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. To date, San Diego region agencies have received more than $150 million under the Title XVI Grant Program. Since 2020, the following projects have been awarded funding through the Title XVI Grant Program:

- 2021: North San Diego Water Reuse Coalition (NSDWRC) Regional Recycled Water Program was awarded $6.1 Million for a regional project to expand recycled water infrastructure and increase water reuse.
- 2022: NSDWRC Regional Recycled Water Program was awarded $17,826,952 for a regional recycled water project to expand interagency connections and improve system capacity with the project expected to deliver 9,060 AFY of recycled water upon completion.
- 2023: City of Oceanside was awarded $201,000 for their *Water Reuse, Recycling, and Seawater Desalination Feasibility Study* to analyze options for expanding the treatment and beneficial use of wastewater effluent, the capture and reuse of storm water, and desalination of seawater.
- 2025: NSDWRC Regional Recycled Water Program was awarded an additional $6.1 Million for its regional recycled water project.

SWRCB Low-interest Loan Program

The SWRCB Division of Financial Assistance offers low-interest financing agreements for water quality projects and water reclamation facilities through the CWSRF. The CWSRF offers agencies a below-market interest rate that can result in substantial savings on debt service. In fiscal year ending June 30, 2024, the SWRCB committed over $52 million in funding to 15 projects, over half of which is for projects that will advance water reuse (SWRCB, 2024). Approximately $289 million was allocated to the SWRCB in fiscal year 2025 for the CWSRF (SWRCB, 2025).

Additional funding for recycled water projects is available from SWRCB through the Water Recycling Funding Program, which provides grants and loans to help cover planning and construction costs.

Integrated Regional Water Management Grant Funding

The San Diego IRWM secured state grant funding for recycled water projects including the development and expansion of regional recycled water infrastructure and interagency connections (see Section 5.3.2, *Groundwater Issues*, under "Funding"). These investments have reduced dependence on imported water supplies, increased local supply reliability, and enhanced overall drought resilience in the San Diego region.

Under the first round of 2020 Proposition 1 funding, approximately $4 million in grant funding was awarded for the North County Recycled Water Project and the San Elijo Stormwater Capture and Reuse Project. The North County Recycled Water Project will allow four member agencies to expand their recycled water deliveries. Additionally, the San Elijo Stormwater Capture and Reuse Project includes upgrades to the San Elijo Water Reclamation Facility, desilting basin improvements to reduce sediment, and outreach and education to support storm water pollution prevention. Together, these projects will increase recycled water production through pipeline installation and stormwater capture and treatment.

In 2022, under Round 2 of Proposition 1, the Ramona-Barona Recycled Water Pipeline and the NSDWRC's Regional Program were awarded $6.1 million in state funding. The Ramona-Barona Recycled Water Pipeline project will construct a new pipeline from Ramona MWD's San Vicente Water Reclamation Plant to an existing non-potable pipeline on the Barona Band of Mission Indians Reservation, providing recycled water for irrigation. This project also provides groundwater benefits as described in Section 5.3.3, *Funding*. The NSDWRC's Regional Recycled Water Program will

expand capacity and connectivity among recycled water storage and distribution systems in North County, enhancing overall regional supply reliability.

Approximately $386 million in 2025 Prop 4 funding is anticipated to be allocated statewide to support water reuse and recycling initiatives, further advancing water supply sustainability across the San Diego region.

5.4.5 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 reduce costs associated with development of recycled water projects. In support of the SWRCB call for salinity and nutrient management planning, the Water Authority and 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 planning process encompassed 17 small groundwater basins with varying levels of use and water quality. Consistent with the Recycled Water Policy, the SCSC and the Water Authority worked with local stakeholders and San Diego RWQCB staff to develop a standardized framework and approach for development of SNMPs in the San Diego region. In November 2010, the *Guidelines for Salinity/Nutrient Management Planning in the San Diego Region* was endorsed by the San Diego RWQCB.

The *Guidelines for Salinity/Nutrient Management Planning in the San Diego Region* establishes priorities based on basin characteristics and significance, providing technical approaches and strategies for managing salt and nutrients in the San Diego Region. In 2011, Proposition 84 IRWM grant funding was secured with support from the San Diego RWQCB for development of the first five SNMPs in the San Diego region. A total of eight SNMPs have been or are in the process of being developed in the San Diego region. Implementation of SNMPs will improve overall water quality and use of groundwater resources in the San Diego region.

The *Guidelines for Salinity/Nutrient Management Planning in the San Diego Region* was highlighted as an example of a regional basin prioritization system during the SWRCB 2018 amendment to the Recycled Water Policy. The 2018 amendment supported 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 RWQCB to maintain ongoing evaluation of groundwater basins in their region and to identify where salt and nutrient conditions pose a threat to water quality that warrants development or revision of a Salt and Nutrient Management Plan.

California WateReuse Action Plan

In 2019, the *California WateReuse Action Plan* was released in collaboration with Water Authority staff and water agency representatives across the state. The plan provides a strategy to advance water reuse in California over 30 years and identifies four strategic areas for action: research,

regulations, regional planning, and funding (WateReuse, 2019). These actions and recommendations are anticipated to more than double the use of recycled water in California to prepare the state for climate change impacts. Several action items in the plan have either been completed or are in progress, including development of statewide regulations for raw and treated water augmentation, studying impacts of diminishing wastewater flows, and onsite reuse.

National Water Reuse Action Plan

The National Water Reuse Action Plan (WRAP) advances water reuse across the nation to ensure water security, sustainability, and resilience through public, federal and state collaboration. 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 WateReuse Association led a coalition of partner water associations, including the Water Authority, to provide input on the WRAP. The WRAP originally identified 10 strategic objectives and 46 actions to be implemented by federal, state, local and private sector partners. Since 2020, the effort has grown to include over 70 actions and 170 leaders and partners, including a Federal Interagency Working Group on Water Reuse, that collaborates to advance recycled water initiatives across the country (USEPA, 2025).

Water Authority staff participate in implementation of the WRAP through WateReuse and in federal workgroups.

5.4.6 Projected Recycled Water Use

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

Table 5-4 Projected Recycled Water Use (Normal Year, AFY)

2025	2030	2035	2040	2045	2050
31,371	34,207	34,463	34,702	34,872	35,042

As shown in Table 5-4, the projected normal year yield for 2025 is 31,371 AFY. The increase in projected recycled water use shown in Table 5-4 in 2030 and beyond is attributed to the expansion of existing facilities and conversion of potable water uses, such as irrigation, to recycled water. For example, the Otay Water District expects significant population growth over the next 30 years. To meet future demands, the Otay Water District requires developers to connect to the recycled water distribution system to serve irrigation needs and anticipates continued increases in recycled water use through 2050.

Additional Planned Projects—Recycled Water

Maximizing recycled water development is critical to diversifying the Table 5-4 water supply portfolio in the San Diego region. Beyond the verifiable project yields included above, member agencies have also identified additional planned projects. The City of Escondido, MCB Camp Pendleton, and Valley Center Municipal Water District have identified additional planned projects projected to yield an additional 7,850 AFY by 2050. These additional planned projects, as well as

the conceptual projects provided by the member agencies, are also included in Appendix F (Table F-4).

5.5 Potable Reuse Supply

Numerous drivers make potable reuse an attractive option for expanding water supplies in 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 San Diego region.

5.5.1 Potable Reuse Background and Description

Recycled water can be further treated for potable reuse using multi-barrier advanced purification treatment processes, which may include technologies such as reverse osmosis and advanced oxidation. Potable reuse comes in two forms, indirect potable reuse (IPR) and direct potable reuse (DPR). IPR incorporates an environmental buffer such as a groundwater basin or surface water reservoir to provide additional treatment for potable purposes. In the instance of groundwater IPR, recycled water may be percolated into groundwater or advanced-treated recycled water can be directly injected into the groundwater basin. Recycled water may also be added to a raw water reservoir used for drinking water supply, where it blends with imported water or other local water supplies; this process is called surface water augmentation. DPR refers to projects that deliver advanced-treated water directly to a raw or treated water pipeline. In raw water augmentation, recycled water is added to a raw water supply immediately upstream of a water treatment plant. In treated water augmentation, recycled water is introduced directly into the water distribution system.

Several Water Authority member agencies are in various stages of planning and constructing 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. In 2021, the City of Oceanside was issued final operational permits to produce advanced treated water for its groundwater augmentation project. The City of San Diego and Padre Dam Municipal Water District (Padre Dam MWD) are constructing reservoir augmentation projects, also referred to as surface water augmentation. In addition, a large coalition of member agencies in North County are evaluating IPR and DPR as part of a plan to optimize recycled water efforts. Detailed member agency project information can be found in Section 5.5.3, *Projected 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 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.

In the San Diego region, potable reuse was first considered in the early and mid-1990s. The Water Authority and City of San Diego proposed a potable reuse project to deliver advanced treated water from the North City Water Reclamation Plant and convey to San Vicente Reservoir to 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, the Repurified Water Review Committee, to advise the Board of Directors 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 as part of a diversified mix of water supplies. The Water Authority sponsored an independent expert advisory panel on IPR and, together with The City of San Diego, conducted detailed studies submitted to state health authorities to determine regulatory guidelines for an IPR project that would blend advanced treated recycled water in San Vicente Reservoir. The California Department of Public Health Drinking Water Program (CDPH), 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, *Issues in Potable Reuse: The Viability of Augmenting Drinking Water Supplies with Reclaimed Water*, which concluded that planned IPR was a viable water supply option (National Research Council, 1998). In 2012, CDPH and the San Diego RWQCB conceptually approved the City of San Diego proposed IPR project for surface water augmentation in San Vicente Reservoir.

By 2020, the City of San Diego had revised its proposed surface water augmentation project to instead be implemented at Miramar Reservoir. In May 2020, the San Diego RWQCB adopted the first National Pollutant Discharge Elimination System (NPDES) permit to allow the City of San Diego to introduce purified water to the Miramar Reservoir as part of the Pure Water San Diego Program.

California formally adopted statewide regulations for DPR in 2023, setting enforceable treatment standards, operator requirements, source control expectations, and monitoring protocols for agencies seeking to introduce advanced purified water directly into drinking water systems. Although DPR projects have not been approved in California, progress in project development has occurred in the state and across the nation. In 2013, the first permanent DPR project in the nation began operations in Texas in response to extreme drought conditions. Years of advanced research on potable reuse in California and elsewhere demonstrates reliable technology is available for agencies to safely implement DPR as a viable treatment option. As water supplies become increasingly scarce, particularly in the arid west, more potable reuse projects are likely to be proposed throughout the state.

Economic and Financial Considerations

Potable reuse projects have an advantage over non-potable recycled water projects, as they do not require construction of a dual distribution system. Once treatment and conveyance facilities have been constructed, the full amount of water produced can be available to augment local water supplies. Costs for potable reuse are similar to other alternative water supply projects, but costs may be significantly affected by proximity of a treatment facility to a reservoir. Regulatory requirements can also have a significant impact on overall project costs. Another benefit of this type of project would be to meet waste discharge requirements.

Institutional

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

However, additional factors are considered for potable reuse projects related to treatment technologies, regulatory requirements, and increased coordination between operators of advanced treatment facilities and local surface water treatment facilities for projects with a downstream surface water treatment plant. Operator certification was identified by the SWRCB expert panel on DPR in their 2016 report. In response to this need, the California-Nevada Section of the American Water Works Association and the California Water Environment Association 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, WateReuse California, and other water utilities throughout California. As of September 2025, 250 Advanced Water Treatment Operator certifications have been established through this program. The certification program will support increased knowledge and coordination to ensure a safe reliable drinking water supply.

Public Acceptance

Like recycled water, public acceptance for potable reuse projects is critical for project success. While the technology for potable reuse projects has been developed and proven to be safe for drinking water supplies, these projects must gain public acceptance. In the San Diego region, project proponents have conducted a substantial amount of public outreach for potable reuse projects. Tours of demonstration facilities, such as those constructed by the City of San Diego and Padre Dam MWD, have proven highly successful in educating the public on the safety of the product water. In addition to in-person tours, agencies have further developed informational videos and have made virtual tours of their projects available online to the public. Polls in the San Diego region have demonstrated increasing public acceptance of potable reuse as a safe water supply in response to these public outreach efforts.

The Water Authority has worked with the member agencies through the Potable Reuse Coordination Committee to develop common language and messaging throughout the San Diego region. This ad hoc committee, consisting of regional agencies interested in developing and promoting potable reuse projects, aims 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 in the WateReuse California Communications Collaborative Group, which provides a forum to discuss and collaborate on potable water reuse communications. In 2019, the group released an *Updated Terminology* report approved by WateReuse California and the Association of California Water Agencies which provides outreach professionals with a framework to discuss water reuse with the public and a glossary of commonly encountered technical reuse terms.

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 review and provide recommendations to the project proponent and DDW. The state has passed legislation to support development of potable reuse regulations, including 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. The California Legislature also passed AB 574 in 2017. This legislation, co-sponsored by WateReuse California and California Coastkeeper Alliance, further expedited development of regulations for DPR.

Below is an overview of the timeline of DPR regulations:

- June 2014 – California Department of Public Health (CDPH) adopted regulations for groundwater potable reuse projects
- December 2016 - SWRCB reported to the California Legislature that it is feasible to develop regulations for DPR
- 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
- August 2019 - SWRCB released second draft of the *Framework for Regulating Direct Potable Reuse in California*
- March 2021 - SWRCB released addendum to the *Framework for Regulating Direct Potable Reuse in California* including an early draft of the anticipated criteria for DPR
- June 2022 - DPR Expert Panel submits memo finding the draft criteria adequately protect public health
- December 2023 - SWRCB adopted regulations for DPR through raw water and treated water augmentation
- October 2024 - DPR regulations become effective

As noted above, DPR regulations became effective in October 2024; these regulations will permit water suppliers in the San Diego region to maximize the use of existing infrastructure to produce a new, safe, and viable potable water supply.

Expert Panels

Expert science panels and stakeholder advisory groups provided key support for the development of surface water augmentation and DPR regulations in California. In February 2014, CDPH formed a Public Advisory Group, which included the City of San Diego and Padre Dam MWD, as well as other San Diego interest groups. Among other tasks, the Public Advisory Group provided feedback on developing common terminology to describe potable reuse and the need for certified operators for advanced treatment facilities.

In 2010, Senate Bill 918 required CDPH to convene an expert panel to investigate and report on the feasibility of developing uniform recycled water criteria for DPR. The Expert Panel convened in 2014 and was administered by the National Water Research Institute. The panel was comprised of experts in toxicology, wastewater treatment, drinking water supplies treatment, drinking water standards, epidemiology, limnology, microbiology, and chemistry. The panel considered the proposed research agenda of the WateReuse Research Foundation and provided recommendations to DDW regarding possible research gaps. DDW presented for consideration a proposed framework for surface water augmentation, focusing on multiple treatment barriers for removal of pathogens and chemical constituents and approaches for ensuring the reliable monitoring and operation of treatment processes.

In August 2016, the Expert Panel completed its Final Report on *Investigation on the Feasibility of Developing Uniform Water Recycling Criteria for Direct Potable Reuse* (SWRCB, 2016). The Expert Panel found it is technically feasible to develop uniform recycled water criteria for DPR in California, with public health protection as good as or better than conventional drinking water

supplies and IPR. As required by law, the SWRCB considered the recommendations of the Expert Panel and Advisory Group in its report to the legislature.

In addition, DDW released *A Proposed Framework for Regulating Direct Potable Reuse in California* that provides a regulatory approach for DPR and consideration of drinking water treatment plants (SWRCB, 2019). In 2021, the SWRCB reconvened the DPR Expert Panel to advise on the development of regulations, as required by AB 574. The SWRCB provided the Expert Panel with the proposed draft criteria for DPR in August of 2021. In June of 2022, the Expert Panel submitted their Preliminary Findings and Recommendations on Draft DPR Criteria. The panel provided several recommendations for the SWRCB to consider when developing the DPR regulations and ultimately found that the proposed criteria adequately protect public health.

Permitting of Potable Reuse Projects

Potable reuse projects require collaboration between the San Diego RWQCB and DDW. Permitting processes may look different depending on the type of potable reuse project.

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 conform to groundwater recharge criteria.

Local surface water augmentation projects are also permitted by the San Diego RWQCB for 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 requirements are incorporated into NPDES permits.

DPR projects must also comply with requirements in the Water Quality Control Policy for Recycled Water. Raw water augmentation projects that involve discharging advanced-treated water into local reservoirs are also subject to permitting requirements for those discharges.

Funding of Potable Reuse Projects

The primary sources of outside funding available for potable reuse projects include grants and loans from Title XVI, Clean Water State Revolving Funds, the Water Recycling Funding Program, and the state IRWM Program.

Under the San Diego IRWM Program, Propositions 50, 84, and 1 have provided support for potable reuse funding for the City of San Diego water purification demonstration project, Padre Dam MWD potable reuse demonstration project, and the WateReuse Foundation's Failsafe Potable Reuse project. These projects provided critical research to advance potable reuse in the San Diego region and in California. Proposition 84 also funded the expansion of Padre Dam MWD's Ray Stoyer WRF, increasing supply availability for potable reuse projects. As noted under Figure 5-3, the Ray Stoyer WRF was taken offline in October 2025; recycled water for Padre Dam MWD will be produced by the East County AWP. Proposition 1 has provided funding support for both the City of San Diego Pure Water and the City of Oceanside Pure Water Programs for a combined total of approximately $3 million.

In 2020, the City of San Diego Pure Water received additional funding from Proposition 1, Round 1 for the North City Pure Water Facility Influent Pump Station project. This project, part of Phase 1 of the City of San Diego Pure Water Program, involves constructing an influent pump station to convey treated tertiary effluent from the North City Water Reclamation Plant to the future Pure Water

Facility for purification and potable reuse.

In 2022, the City of Oceanside received additional funding from the Proposition 1, Round 2 state grant for the Oceanside Mesa Garrison Force Main (OMG FM) River Crossing project, which provides groundwater and potable water reuse benefits. The project is an integral part of a larger OMG FM project and a key component of the Pure Water Oceanside Program that aims to produce new local potable reuse water for the region.

Title XVI has also provided considerable support for potable reuse projects in the region. Awards since 2020 include:

- 2020: City of San Diego was awarded $1.16 million for the design of Pure Water San Diego Phase 1 which is a surface water augmentation project that will produce up to 33,600 AFY of new water supply for the City of San Diego through IPR.
- 2022: City of Oceanside Pure Water Oceanside Program was awarded $9,941,533 and is expected to provide 3,360 AFY of additional water supply for the City of Oceanside (USBR, 2022).
- 2022: Padre Dam Municipal Water District was awarded $28,300,000 for the East County Advanced Water Purification Program which will produce up to 12,882 AFY (USBR, 2022).
- 2023: City of San Diego was awarded $750,000 for the planning of Pure Water San Diego Phase 2 which will provide up to an additional 59,400 AFY of new water supply for the City of San Diego (USBR, 2023).

5.5.2 Water Authority Activities in Support of Potable Reuse

For over 20 years, the Water Authority has supported and been an active participant in advancing the goal of implementing potable reuse in San Diego County. The recent focus of the Water Authority is on efforts to advance potable reuse through advocacy for legislation and regulations that move projects forward in the near future. Water Authority staff have been prominently involved through participation in the WateReuse Association and WateReuse legislative and regulatory committees, and through other regulatory advocacy venues, including attending and providing comments at Expert Panel meetings, serving on stakeholder committee meetings, and advocating for and supporting member agency interests.

The Water Authority tracks trends in public acceptance of recycled water projects through public opinion surveys which provide a foundation for member agency outreach and measures the effectiveness of outreach efforts. For example, in 2015, 71% of respondents believed it was possible to further treat recycled water used for irrigation to make water safe for drinking. This was an increase from 66% from surveys collected in 2011. The 2011 and 2015 survey results represent a substantial increase over the 2009 survey response where 53% thought it was possible. In 2019, 79% of respondents supported using advanced treated recycled water as an addition to existing drinking water supplies.

Water Authority staff have supported member agencies in three key areas: public outreach and messaging, engaging with regulatory agencies, and helping secure funding for local projects. While member agencies will lead the development of their own projects, the need continues for regional coordination and collaboration on potable reuse issues.

Water Authority staff have supported member agencies by actively engaging in public outreach in support of member agency projects. Under the San Diego IRWM, the San Diego County Water Authority serves as the grantee and grant administrator on behalf of the Regional Water Management Group, securing and managing state funding for various types of projects, including potable reuse initiatives. This support has included:

- Coordinating with member agencies through the Joint Public Information Committee to develop common outreach messaging that will support potable reuse projects.
- Collaborating with member agencies through the Potable Reuse Coordination Committee and Recycled Water Workgroups.
- Conducting public outreach to increase acceptance of potable reuse through presentations, handout materials and videos, and information sharing through the Water Authority's website.
- Communicating 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.
- Engaging with SWRCB members and staff on the safety and importance of potable reuse.
- Working with other organizations that support potable reuse including WateReuse, and state and local environmental groups on common outreach to support potable reuse.
- Advocating at the state and local level for reasonable regulations that will support the safe use of recycled water for local potable reuse projects.
- Partnering 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.
- Administering grant funds for regional projects to ensure compliance with state grant programs.

5.5.3 Projected Supply through Potable Reuse

The Water Authority coordinates with its member agencies to determine the projected yield from existing and planned potable water reuse projects. Table 5-5 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 Chapter 9, *Water Supply Reliability*. Appendix F (Table F-5) lists these projects and projected supplies.

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

2025	2030	2035	2040	2045	2050
	49,842	110,882	110,882	110,882	110,882

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

In 2020, the City of Oceanside began construction to expand its existing recycled water system and develop an advanced water purification facility (AWPF), pipelines, and injection wells as part of the Pure Water Oceanside program. The AWPF has the capacity to produce and is permitted to inject 3 million gallons per day of advanced treated water into the Mission Basin Aquifer. The final operational permits to produce advanced treated water for injection were issued in 2021. Pure

Water Oceanside purifies nitrified-denitrified secondary effluent wastewater from the San Luis Rey Water Reclamation Facility through advanced treatment to create a new local and high-quality drinking water source. Water is purified using filtration, reverse osmosis, and ultraviolet light advanced oxidation, before it is injected into the aquifer where it will blend with naturally occurring groundwater and recharge the aquifer. The water is then extracted and treated at the Mission Basin Groundwater Purification Facility before distribution to customers. When all the components are fully operational, the Pure Water Oceanside program is anticipated to provide more than 30% of the City of Oceanside water supply.

The City of San Diego Pure Water San Diego is a phased, multi-year program that will produce purified water to supplement their drinking water supply. Phase 1, categorized as verifiable, will produce up to 33,600 AFY of purified water for augmentation of Miramar Reservoir, with startup anticipated in 2027 and ramping up to full production thereafter. 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 of San Diego'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-half of the City of San Diego's water supply. Pure Water San Diego is also projected to reduce the amount of treated wastewater the City of San Diego discharges 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 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). Formed in 2019, the JPA members consist of Padre Dam MWD, City of El Cajon and County of San Diego which serve as the program governing body. The first project phase is categorized as a verifiable supply and will provide up to 12,880 AFY of purified water to Lake Jennings with a total capacity of up to 15,680 AFY. This project is expected to meet 30% of the current drinking water demands in East County.

Conceptual Potable Reuse Projects

There are several conceptual potable reuse projects in the San Diego region, which, if implemented, could contribute approximately 18,000 AFY of additional potable reuse supply by 2050.

Conceptual potable reuse projects also include the City of Escondido potable reuse project, Camp Pendleton indirect potable recharge project, and Vallecitos Water District Meadowlark Water Reclamation Facility DPR project. Conceptual projects also include subsequent phases of the East County AWP and a regional project among several water and wastewater agencies in North County. More information about conceptual potable reuse projects can be found in Appendix F, Table F-5.

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 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. More information about the Carlsbad Desalination Plant and water supply development through desalination is available online: https://www.sdcwa.org/your-water/local-water-supplies/seawater-desalination/.

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 (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** – La Jolla, Rincon, San Pasqual, Pauma, and Pala Bands of Mission Indians, which act through the governing body of each Indian Band as recognized by the United States Secretary of the Interior
- **Local Entities** – City of Escondido and Vista Irrigation District
- **San Luis Rey Indian Water Authority**

Through the San Luis Rey Indian Water Rights Settlement Act, the United States authorized up to 16,000 AF per calendar year of conserved water from projects like lining portions of the American Canal and Coachella Canal 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, State of California, San Luis Rey Indian Water Authority, and the Indian Bands for the purpose of resolving all claims, controversies, and issues involved in all 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 Vista Irrigation District.

5.7.2 San Luis Rey Water Delivery

In 2017, the City of Escondido and Vista Irrigation District began receiving wheeled water deliveries from the San Luis Rey Indian Water Authority. Beginning September 2019, the San Pasqual Indian Band began receiving a small portion of the supplemental water transfer wheeled through Valley Center Municipal Water District. Additionally, the Rincon Indian Band 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 Indian 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 5-6.

Table 5-6 Projected Water Transfers (Normal Year, AFY)

2025	2030	2035	2040	2045	2050
15,800	15,800	15,800	15,800	15,800	15,800

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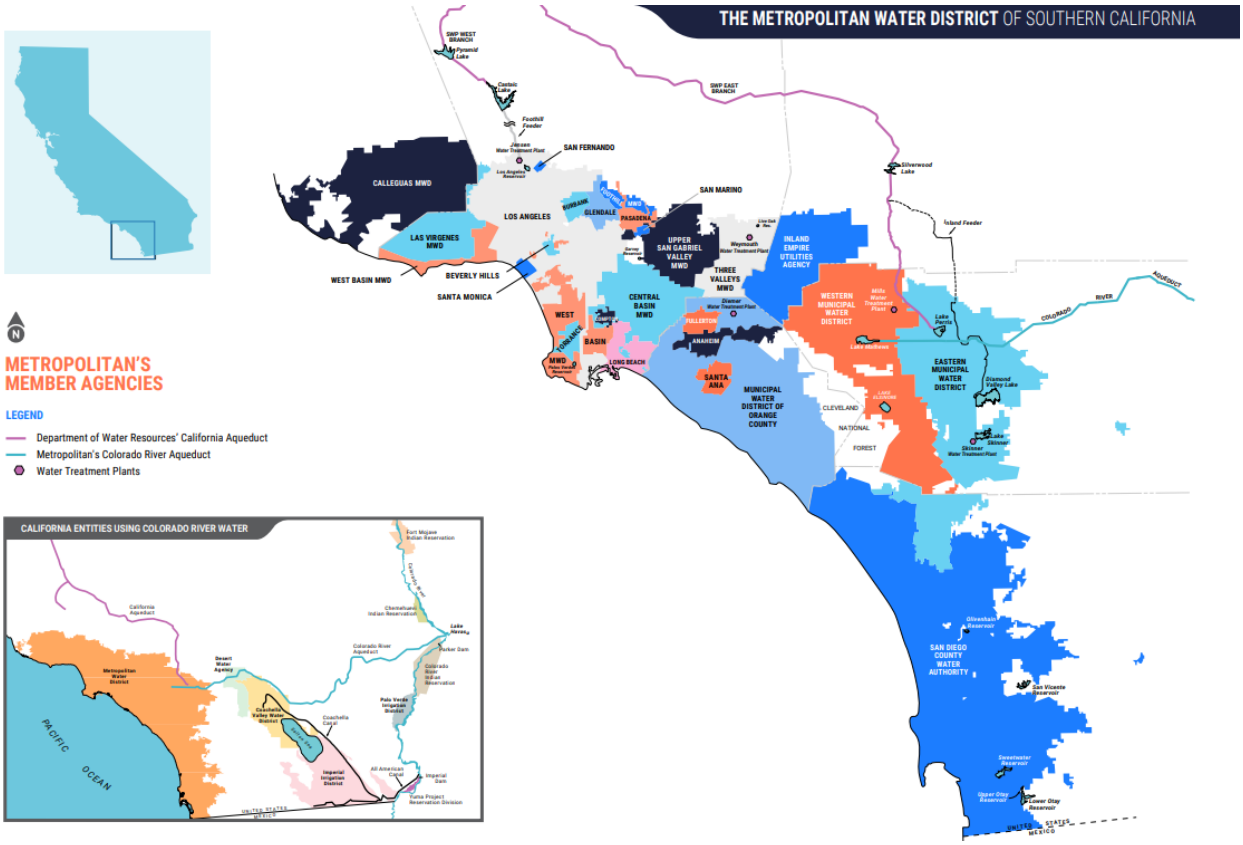
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Chapter 6: Metropolitan Water District of Southern California

6.1 Introduction

The Water Authority relies on water purchases from Metropolitan to meet its supplemental water 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 the Metropolitan service area, which includes portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties (Figure 6-1). The Metropolitan service area extends 200 miles along the Pacific Ocean from the city of Oxnard in the north to the Mexican border in the south and reaches 70 miles inland from the Pacific Ocean coastline. Historically, 40% to 60% of 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, Water Authority purchases from Metropolitan have declined. This trend reflects the Water Authority's long-term strategy to diversify its supply portfolio and optimize the use of locally controlled and transferred water supplies. Metropolitan. In fiscal year 2025, the Water Authority purchased 66,000 AF, or 7% of all Metropolitan water sold. This above-average purchase included approximately 50,000 AF of water delivered through a coordinated exchange agreement involving the Water Authority, Metropolitan, and the USBR to support water conservation efforts at Lake Mead. The extent to which Metropolitan member agencies rely on Metropolitan water supplies varies by the amount of local water supplies available and reliability goals of each Metropolitan member agency. Water Authority demands on Metropolitan are included in Metropolitan's 2025 UWMP and can be found in Appendix G, *Water Authority Demands Provided by Metropolitan*, of this 2025 UWMP.

Figure 6-1 Metropolitan Service Area



6.1.1 Metropolitan Water District Act Section 135 - Preferential Right to Water

Under Section 135 of the Metropolitan Water District Act, each Metropolitan member agency has a preferential right to Metropolitan's water supplies. The MWD Act stipulates that Metropolitan 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 Metropolitan member 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 Metropolitan member agency, including the Water Authority, to Metropolitan water. How Metropolitan calculates its preferential rights, specifically regarding Water Authority payments to transport its independent Colorado River water supplies, was clarified through the 2010 litigation filed by the Water Authority challenging Metropolitan rates. Following the finalization of the Appellate Court ruling in 2017, Metropolitan updated how it calculates Metropolitan member agencies' preferential rights and includes the Water Authority payments for Metropolitan water transportation services. As of June 30, 2025, the Water Authority has a preferential right to purchase 28.61% of Metropolitan water. As a comparison, the Water Authority purchased 7% of the water Metropolitan sold in fiscal year 2025.

Section 2.3 of Metropolitan's 2025 UWMP presents Metropolitan's water supply capability at the regional level, rather than at the member agency level, concluding that Metropolitan has sufficient supply capabilities to meet expected demands under the single driest year and the multiple dry year hydrology through 2050. Metropolitan's 2025 UWMP forecasts imported water supply capabilities under normal (defined by Metropolitan as a repeat of the 1922-2021 hydrologic cycle), single driest year (repeat of 1977), and multiple dry-year (repeat of 1988-1992) hydrology through 2050 (Metropolitan, 2025). Metropolitan's 2025 UWMP also includes Tables 2-4, 2-5, and 2-6, which show water supply capabilities for current imported water and service area programs under normal year, single dry-year, and multiple dry-year conditions (Metropolitan, 2025). Sufficient supplemental imported water supply would be available to the Water Authority in normal years, a single dry year, and multiple dry years.

6.2 Metropolitan Water Supplies

Metropolitan obtains imported water supplies from two sources, the Colorado River and the SWP. Imported water supplies from the Colorado River are transported by the Colorado River Aqueduct, which is owned and operated by Metropolitan. Imported water supplies from the SWP are transported by the California Aqueduct and through a contract with the state. Figure 6-2 shows these imported water supply sources and are described later in this chapter. To manage challenges from dry hydrologic conditions and regulatory restrictions that limit supplies from the SWP, Metropolitan uses storage programs to set aside excess water supplies in wet years for use in dry years. Water years 2020-2022, combined, ranked as the three driest years in state precipitation record. In 2022, following two consecutive dry years and a SWP allocation of 5%, Metropolitan was unable to meet the demands of six of its member agencies in the northern portion of its service area that only had access to Metropolitan's SWP water supplies and water stored along the SWP. For the first time in history, DWR used a provision of the SWP contract to allocate water on a basis other than Table A to meet minimum demands of contractors for human health and safety. Metropolitan requested and received delivery of human health and safety water supplies from DWR to partially meet the demands of the six impacted Metropolitan member agencies.

Additionally in 2022, Metropolitan implemented mandatory water use reductions through an Emergency Water Conservation Program for these six agencies. Subsequently, Metropolitan is investing in infrastructure improvements designed to allow water stored in Diamond Valley Lake and Lake Mead to be delivered to more parts of the Metropolitan service area. Since the Water Authority and its member agencies reduced reliance on supplies delivered via the SWP, enhanced water reliability in the Water Authority service area through investments in water use efficiency, and created a diversified water supply portfolio, the Water Authority was not affected by the water supply restrictions from Metropolitan during 2022.

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 Colorado River Aqueduct to convey this water, which was first delivered to Metropolitan member agencies in 1941. The Colorado River Aqueduct is over 240 miles long, beginning at Lake Havasu on the Arizona/California border and ending at Lake Mathews in Riverside County. The Colorado River Aqueduct has the capacity to deliver up to 1.25 million AFY (MAFY). Figure 6-2 shows the location of the Colorado River Aqueduct.

Reliability Issues

The *1931 Seven Party Agreement on the Division of Colorado River Water Among California Water Agencies* (1931 Seven Party Agreement) established California's priorities for water among the state's Colorado River contractors (PVID et al., 1931). The first four priorities total 4.4 MAFY. Metropolitan has priorities 4, 5(a), and 5(b) water listed in the 1931 Seven Party Agreement, but only priorities 1 through 4 are within California's basic annual apportionment of 4.4 MAFY. Metropolitan's fourth priority of 550,000 AFY is junior to that of the first three priorities which total 3.85 MAFY for 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.

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

Due to growth in demand from the other states and drought conditions, Metropolitan deliveries have been limited since 2003 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 2003 QSA set up mechanisms for California to manage demands within its 4.4-MAFY apportionment of Colorado River water and to conserve and transfer water between willing buyers and sellers (IID et al., 2003).

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

- California: 4.4 MAFY
- Arizona: 2.8 MAFY
- Nevada: 300,000 AFY

Under the 2007 *Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead* (2007 Interim Guidelines) (USDOI, 2007), and because California has senior water rights, California 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 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* (DCP) (USBR, 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 elevation drops below 1,045 feet. Depending on lake elevation, the state Lower Basin DCP contributions range from 200,000 to 350,000 AFY, with Metropolitan responsible for approximately 90%. As of April 2025, the 5-year projections of the likelihood of shortage and Lower Basin DCP triggers indicate it is unlikely that Lake Mead will reach a level that would require contributions from the state through 2026, when the current operating agreements end. Both the 2007 Interim Guidelines and the Lower Basin DCP expire in 2026.

New operating agreements are being negotiated that will govern shortage criteria and reductions post 2026. 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 December 2024, Metropolitan had approximately 1.3 MAF of ICS water stored in Lake Mead.

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 Colorado River Aqueduct. Some species that are on endangered or threatened lists under the federal or California Endangered Species Acts 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 HCP) 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* HCP also covers operations of federal dams and power plants on the Colorado River, and the changes in point-of-diversion on the river for the Water Authority's conserved water transfer and canal lining projects.

Water Quality Considerations

Please see Chapter 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 MAFY. With the 2003 QSA and related agreements among the IID, the Coachella Valley Water District (CVWD), State of California, USBR, 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 its 4.4-MAFY basic annual apportionment of Colorado River water.

Metropolitan's other imported supply source, via the SWP, does not have ample system storage, faces regulatory and operational uncertainties, and is more susceptible to hydrologic challenges. Therefore, Metropolitan has relied on other programs such as land fallowing, storage, and exchange programs to increase its Colorado River supplies. Major programs include Metropolitan

ICS account in Lake Mead, interstate exchange program with the Southern Nevada Water Authority, Palo Verde Irrigation District (PVID) Land Fallowing Program, Bard Water District and Quechan Indian Tribe Land Management and Seasonal Fallowing Programs, and IID/Metropolitan Conservation Program. Metropolitan is also evaluating the feasibility of Pure Water Southern California, which would deliver 150 million gallons per day (MGD) if constructed. Water Authority transfer supplies developed under the QSA are managed independently but in coordination with Metropolitan's broader Colorado River supply portfolio.

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 IID, CVWD, and Metropolitan. The 2003 QSA also implemented a settlement for certain San Luis Rey Indian Tribes, providing them with 16,000 AFY of conserved water each year. This permitted implementation of a variety of water conservation and transfer agreements, including the Water Authority's conserved water transfer agreement with IID. The 2003 QSA also provides that CVWD and Metropolitan put aside, for the term of the agreement, a dispute over beneficial use of water by IID, and that Metropolitan would refrain from diverting all of the water it is entitled to from the river when necessary to ensure that senior rights, such as those held by tribes in California, are satisfied.

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 (including the Water Authority's conserved water transfer and canal lining water) to 1.25 MAFY to match its maximum Colorado River Aqueduct delivery capacity. Metropolitan's 2025 UWMP estimates Colorado River Aqueduct deliveries from 2030-2050 as follows (Metropolitan, 2025):

- 1,250,000 AFY in normal year conditions
- 1,250,000 AFY in single dry-year conditions
- 1,189,200-1,250,000 AFY under multiple dry-year conditions

6.2.2 State Water Project

The SWP is owned by the State of California and is managed and operated by the DWR. Metropolitan has a take-or-pay supply contract with the state and is entitled to take about 46% of available SWP water through its long-term SWP water supply contract (referred to as the Table A allocation). The SWP 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 Bay-Delta, which provides the means to deliver water from Northern California to Southern California. SWP facilities provide drinking water to 27 million Californians and 750,000 acres of irrigated farmland. Figure 6-2 shows the California Aqueduct.

Over the last five years, the Water Authority has received an average of 2% of its water supplies via the SWP as a member agency of Metropolitan. In some years the Water Authority uses minimal supplies delivered via the SWP due to the San Diego region's efforts to conserve water and diversify supply sources. The Water Authority's limited reliance on SWP supplies further reflects its diversified supply strategy and reduces exposure to hydrologic and regulatory variability.

Operational Considerations

The reliability of supplies delivered via the SWP is limited by hydrologic conditions, current reservoir storage, pumping restrictions due to state and federal environmental regulations and combined requests from SWP contractors. 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 CVWD, Desert Water Agency (DWA), and Metropolitan. The exchange agreement provides for the transfer of 88,100 AFY of Metropolitan Table A amount to CVWD and 11,900 AFY of Metropolitan's Table A amount to DWA.

In 2006, Governor Arnold Schwarzenegger established the "Delta Vision" through Executive Order S-17-06. The Delta Vision is a policy initiative and planning process aimed to identify long-term solutions to resolve resource conflicts in the Bay-Delta, including those concerning natural resources, infrastructure, land use, and governance. To meet The Delta Vision included recommendations to restore habitat in the Delta in ways that support reliable water deliveries. In response to these recommendations, the California Natural Resources Agency (CNRA) prepared the *Bay-Delta Conservation Plan* (BDCP), which led to plans for a conveyance and ecosystem restoration effort. This resulted in what was called the "California WaterFix," a twin-tunnel project comprised of three new intakes and two 30-mile-long tunnels that would be capable of moving up to 9,000 cubic feet per second (cfs) of water from the Delta in the north to existing aqueduct systems in the south. California WaterFix was proposed to work as a dual system with existing Bay-Delta facilities for the SWP and the Central Valley Project (CVP). Following the election of Governor Gavin Newsom, the state moved away from the twin-tunnel approach of California WaterFix in favor of a water resilience portfolio approach, including development of the Delta Conveyance Project, a single-tunnel design. As with California WaterFix, the Delta Conveyance Project would work as a dual system with the existing waterway but would use a single tunnel with two new intakes capable of conveying 6,000 cfs of water (instead of dual tunnels with capacity of 9,000 cfs).

In June 2020, the U.S. Army Corps of Engineers informed DWR that it will prepare a stand-alone Environmental Impact Statement (EIS) for the Delta Conveyance Project, exercising its regulatory authority over activities within waters of the United States; the EIR is expected to be completed in step with the Environmental Impact Report (EIR). The DWR certified a Final EIR for the Delta Conveyance Project in December 2023. Project permitting is expected to be completed in 2026. 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. In May 2024, the Delta Conveyance Design and Construction Authority released an updated cost assessment for the 6,000-cfs Delta Conveyance Project of $20.1 billion (in undiscounted 2023 dollars).

Metropolitan does not assume the implementation of the Delta Conveyance Project in developing its supply capabilities. Metropolitan assumed near-term actions that would provide annual SWP Table A supplies of about 959,000 AFY on average.

Environmental Considerations

In recent years, actions taken to protect the ecosystem of the Delta have placed additional restrictions on SWP operations. In November 2019, DWR released an EIR for long-term operations of the SWP to ensure its operations comply with the California Endangered Species Act (DWR, 2024). 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 SWP under new rules that increased restrictions.

In October 2024, DWR published a new Final EIR to update long-term operations. The updated EIR evaluated the applicable resource areas and determined that, with respect to each resource area, the Proposed Project (the updated long-term operations of the SWP) would have either no impact or a less-than-significant impact on the environment.

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 delivered via the SWP including Metropolitan. The *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (Bay-Delta WQCP) (SWRCB, 2018) establishes water quality standards and flow regime for the interior Delta tidal network and the larger estuary of the San Francisco Bay and surrounding coastal areas. Water rights decisions assign responsibility for implementing objectives of the Bay-Delta WQCP to users throughout the system, typically by adjusting water rights. Since 2000, the SWRCB's Water Rights Decision 1641, which aims to ensure that water quality objectives in the current Bay-Delta WQCP are met, has governed the SWP's ability to export water from the Delta for delivery to SWP contractors south of the Delta.

In 2025, state, federal, and local water agencies and non-governmental organizations were also negotiating a set of voluntary agreements to implement the goals of the Bay-Delta WQCP through new habitat, flows, and funding for environmental projects and science programs. Metropolitan is participating in the SWRCB's proceedings and voluntary agreement discussions. In December 2025, the SWRCB released a revised draft update to the Bay-Delta WQCP. In January 2026, the SWRCB held a series of public hearings to receive further input from the community. See Chapter 7, *Water Quality*, for additional information.

Current Supplies

Metropolitan's supplies delivered via the SWP are projected using DWR's *2023 State Water Project Delivery Capability Report* (DWR, 2024a). This report presents current DWR estimates of the amount of water deliveries under current 2023 conditions and under projected conditions over the next 20 years. As part of the 2025 UWMP, Metropolitan will update its deliveries via the SWP under dry and long-range demand scenarios.

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. Metropolitan's 2025 UWMP estimates that for 2030-2050, the SWP's programs (including transfers and storage withdrawals) will provide the following quantities of water to Metropolitan:

- 1,641,000-1,723,000 AF in normal year conditions
- 622,000-662,000 AF in single dry-year conditions
- 579,400-733,200 AF under multiple dry-year conditions

6.2.3 Storage Management Programs

Metropolitan relies on water in storage to augment imported water supplies. It manages its storage portfolio by storing water during excess supply years to meet the region's needs when Metropolitan 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 Metropolitan storage influences the likelihood that Metropolitan will have adequate water 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 *Water Surplus and Drought Management Plan* (Metropolitan, 1999).

Metropolitan has several active 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 MAF. Metropolitan dry-year storage was at its highest level, nearly 3.8 MAF, at the end of calendar year 2025.

Metropolitan's 2025 UWMP indicates that for 2030-2050, the in-region storage supplies and "current programs" are projected to produce 733,000-827,000 AF in a normal year, 733,000-827,000 AF in a single dry-year; and146,000-165,000 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 SWP system may be restricted due to low allocations delivered via the SWP limiting Metropolitan ability to "take" Central Valley groundwater storage programs via exchange and due to these storage programs' limitations to return water with pumping. On the Colorado River, Metropolitan access to its ICS stored in Lake Mead may be limited by available capacity in its Colorado River Aqueduct. Shortage guidelines under the 2019 Drought Contingency Plan, which expanded the ICS program, also establish limitations for accessing ICS under certain elevation triggers.

The 2007 Interim Guidelines, which created the ICS mechanism, expired on December 31, 2025. The DCP expires at that same time. Special provision for delivery and accounting of Intentionally Created Surplus will remain in effect through December 31, 2036, allowing Metropolitan to maintain access to stored water during this period. New operating agreements for the Colorado River designed to replace the 2007 Interim Guidelines could apply additional limitations on Metropolitan access to its stored water. Related to Metropolitan service area storage programs, withdrawals from groundwater Conjunctive Use Programs may be limited by agreement provisions or overlaying agencies' demand for Metropolitan water. Storage programs provide critical flexibility in managing supply variability and supporting regional reliability and are incorporated into the Water Authority's planning framework.

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Chapter 7: Water Quality

7.1 Introduction

The Urban Water Management Planning Act (UWMP Act) requires water suppliers to include information, to the extent practicable, about the quality of existing water supply sources and the way water quality affects their reliability. Significant tasks for the Water Authority are to protect the quality of water passing through its delivery system and communicate water quality changes to member agencies. This chapter introduces each water source and summarizes the water quality issues associated with those supplies that serve the San Diego region.

The Water Authority does not directly deliver water to customers, which occurs through the member agencies. The Water Authority member agencies are water suppliers that directly deliver water to customers in their respective service areas. Water suppliers 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 USEPA establishes federal primary and secondary maximum contaminant levels (MCLs) in drinking water under the Safe Drinking Water Act. The SWRCB, through the DDW, establishes primary and secondary MCLs for the state, which must be at least as stringent as the federal MCLs. A primary MCL is an enforceable standard set based on health effects. A secondary MCL is an enforceable standard based on the aesthetic quality of water. All MCLs take into consideration health effects, occurrence, and cost of treatment. The State Office of Environmental Health Hazard Assessment (OEHHA) 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, the 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 constituent exceeds 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 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 cost of supplying water likely increases. High TDS concentrations have an even

greater impact on recycled water supplies, which have TDS concentrations approximately 200-300 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 raw water from the SWP with Colorado River water, as Colorado River water has substantially higher TDS than SWP water. Metropolitan also participates in cooperative programs aimed at reducing salinity concentrations in its source supplies. The Colorado River Basin Salinity Control Forum is an interstate organization that implements salinity control measures, such as improved irrigation practices and operation of a deep well brine injection project, to prevent salt from entering the river. Within California, Metropolitan is working with DWR and other agencies to reduce salinity in Delta supplies that flow into the SWP, including implementing programs to reduce salinity on the San Joaquin River through improved irrigation practices.

Through the collaborative efforts described above, Metropolitan has typically been able to keep salinity concentrations in its water deliveries at less than 500 mg/L TDS. However, during dry-year conditions and drought periods when SWP supplies are limited and TDS concentrations are elevated in the Colorado River, Metropolitan's goal of delivering water with less than 500 mg/L of TDS has not been met. Developing new sources of water supply with lower TDS concentrations, such as seawater desalination and potable reuse, may 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 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, algal 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.

Algal toxins are also a national issue. In August 2014, an algae bloom producing microcystins in Lake Erie resulted in a "do not drink" order in Toledo, Ohio. This triggered federal legislation requiring the USEPA to develop health advisories and strategic plans for managing algae toxins. In June 2015, the 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 (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 2018-2020, monitoring for nine cyanotoxins and one cyanotoxin group was required through the Unregulated Contaminant Monitoring Rule regulations. In 2021, OEHHA submitted to the SWRCB recommendations for notification levels for microcystins, cylindrospermopsin, anatoxin-a, and saxitoxin. These recommendations are currently being evaluated by the DDW. The Water Research Foundation has conducted numerous research projects on harmful algal blooms including

development of the *Utility Field Guide for Developing a Cyanobacteria and Cyanotoxin Monitoring Program* (Water Research Foundation, 2025).

7.2.3 Total Organic Carbon and Bromide

Disinfection byproducts (DBPs) form when source water containing high concentrations of total organic carbon (TOC) is treated with disinfectants to remove harmful pathogens, which react with natural organic matter (NOM) where bromide or iodide is present in the source water (USEPA, 2020). Source water quality and surface water treatment processes play an important role in DBPs formation. A link between DBPs 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 DBPs formed during water treatment processes.

- In 2002, EPA Stage 1 Disinfectant and Disinfection Byproducts Rules established new MCLs for DBPs and a treatment technique requirement.
- In 2006, EPA 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 trace element found in rocks, soil, water, and air, and is used in wood preservatives, alloying agents, agricultural applications, semi-conductors, paints, dyes and soaps. In the state, naturally occurring arsenic is commonly found in drinking water sources. Anthropogenic sources also cause elevated levels of arsenic in groundwater through agricultural and industrial activities. 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) (SWRCB, 2024a). 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 reporting (DLR) is 2 µg/L. DDW is currently investigating the technological and economic feasibility of lowering the MCL below the current state and federal MCL and closer to the PHG of 0.004 µg/L.

7.2.5 Uranium

Uranium is a naturally occurring radioactive element commonly found in groundwater developed through 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 state 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 which can be found in the form of chromium-3 or chromium-6 in water supplies. Chromium-6 is used in electroplating, stainless steel production, leather tanning, textiles manufacturing, dyes and pigments, and wood preservation, and 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, the MCL was invalidated by the Superior Court of Sacramento County for failure to properly consider the economic feasibility of complying with the MCL. In 2023, after conducting a more robust economic analysis, the SWRCB

adopted an MCL for Chromium-6 of 10 µg/L with a DLR of 0.1 µg/L. The federal MCL of 100 µg/L for total chromium 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, which dissolve easily and are highly mobile in groundwater. The primary health concern of perchlorate is hypothyroidism and is especially critical for pregnant women 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 DLR to gather additional occurrence data for consideration as part of an MCL review process. The limit was lowered to 2 parts per billion (ppb) in 2021 and decreased to 1 ppb in 2024. DDW is currently reviewing the occurrence data that are collected with the lowered DLR to determine the need to develop a new MCL.

In July 2020, the USEPA decided not to establish a federal MCL. The 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. However, in 2023, the District of Columbia Circuit ordered the USEPA to develop an MCL for perchlorate. The USEPA intends to issue the final regulation by 2027.

7.2.8 Iron and Manganese

Iron and manganese are naturally occurring metals and are considered essential nutrients for the human body but can be considered toxic at high levels of concentration. Both iron and manganese are common groundwater contaminants, as they are found through weathering of rocks and soils, and can mobilize easily in groundwater (SWRCB, 2024b). Manganese also commonly occurs in the anoxic zone of surface water reservoirs and is found in wastewater discharges. Excessive iron in the human body can cause aesthetic issues in water, such as metallic taste and discoloration and rare health conditions like hemochromatosis. Overexposure of manganese can pose neurotoxic risks in infants, children, and adults in high concentrations (SWRCB, 2024b). 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. In 2023, DDW proposed to revise the notification and response levels for manganese from 0.5 mg/l and 5 mg/l to 20 µg/l and 200 µg/l, respectively.

7.2.9 Per- and Poly-Fluoroalkyl Substances

Per- and Poly-Fluoroalkyl Substances (PFAS) are a large group of human-made 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 United States. However, many other PFAS chemicals are still produced and used in numerous consumer and industrial products. 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 water wells.

From 2013-2015, under the EPA's Unregulated Contaminant Monitoring Rule (UCMR) 3, public water systems were required to monitor for PFOS and PFOA. In 2021, the EPA issued UCMR 5, which requires public water systems to monitor 29 PFAS compounds from 2023-2025. In May 2016, the EPA issued a lifetime health advisory for PFOS and PFOA in drinking water of 70 parts per trillion (ppt) in community water supplies. In 2022, the EPA published revised interim health advisories for PFOS and PFOA at 0.02 ppt and 0.004 ppt, respectively. At that time, the EPA also published final health advisories for perfluorobutane sulfonic acid and its potassium salt (PFBS) at 2,000 ppt and hexafluoropropylene oxide dimer acid (HFPO-DA) and its ammonium salt ("GenX chemicals") at 10 ppt. The EPA recommended customer notification when drinking water supply PFOS and PFOA concentrations exceed the health advisory.

DDW has identified developing MCLs for PFAS as among its top priorities. Over the past several years, DDW has issued several new and revised notification and response levels to enhance public awareness of the occurrence of PFAS in drinking water supplies and to ensure that water systems implement appropriate mitigation measures, such as removing affected sources from service or providing treatment, when PFAS concentrations exceed the applicable response level (RL). In 2018, DDW established an interim notification level (NL) of 14 ppt for PFOA and 13 ppt for PFOS, and a single RL of 70 ppt for the combined concentrations of PFOA and PFOS. In August 2019, DDW revised the NL to 6.5 ppt for PFOS and 5.1 ppt for PFOA. In February 2020, DDW issued an updated RL of 10 ppt for PFOA and 40 ppt for PFOS based on a running four-quarter average. In March 2021, DDW issued an NL of 500 ppt and RL of 5,000 ppt for PFBS. In October 2022, DDW established an NL of 3 ppt and an RL of 20 ppt for perfluorohexanesulfonic acid (PFHxS). In October 2025, DDW issued revised NL and/or RLs for PFOA, PFOS, and PFHxS and new NL and RL for perfluorohexanoic acid (PFHxA). See Table 7-1 for a summary of current PFAS NLs and RLs. In 2024, OEHHA released a PHG for PFOA at 0.007 ppt and PFOS at 1 ppt.

In April 2024, the EPA announced the National Primary Drinking Water Standard for six PFAS. PFOA and PFOS were issued MCLs at 4 ppt. PFHxS, perfluorononanoic acid (PFNA), and HFPO-DA (GenX) received individual MCLs. The regulation also implemented a Hazard Index MCL to account for the combined risks of PFHxS, PFNA, HFPO-DA (GenX), and PFBS when present together in drinking water. However, in May 2025, the EPA announced that while it will keep the MCLs for PFOA and PFOS, the agency intends to reconsider the regulatory determinations for PFHxS, PFNA, HFPO-DA (GenX), and the Hazard Index mixture of these three PFAS plus PFBS to ensure regulations align with requirements of the Safe Drinking Water Act process. Table 7-1 summarizes current PFAS notification and response levels as well as the federal drinking water standard.

Table 7-1 DDW Notification and Response Levels for PFAS

Chemical name	Notification Level	Response Level	Federal MCL
PFOA	4 ppt	10 ppt	4 ppt
PFOS	4 ppt	40 ppt	4 ppt
PFHxS	3 ppt	10 ppt	10 ppt
PFNA			10 ppt
HFPO-DA (GenX)			10 ppt
PFBS	500 ppt	5,000 ppt	
PFHxA	1,000 ppt	10,000 ppt	

Chemical name	Notification Level	Response Level	Federal MCL
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA (GenX), and PFBS			1 (unitless) Hazard Index

Since 2019, DDW has issued a series of monitoring orders to better understand the extent of PFAS contamination and data gaps in the state. In January 2020, AB 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. In 2024, DDW issued monitoring orders to 1,142 water systems serving disadvantaged and severely disadvantaged communities. In December 2025, DDW issued monitoring orders to community and nontransient-noncommunity water systems requiring monitoring and reporting consistent with the PFAS National Primary Drinking Water Standard and to establish monitoring and reporting requirements for additional PFAS contaminants in preparation for future California-specific PFAS regulations.

Management options for controlling PFAS include treatment or removing individual wells from service. The EPA 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. It is important for regulatory efforts to also focus on source control solutions to prevent PFAS contamination of water supplies.

7.2.10 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 PFAS, discussed above under 7.2.9, and 1,2,3-trichloropropane (TCP) discussed below.

Nitrosodimethylamine

Nitrosodimethylamine (NDMA) is the most abundantly detected nitrosamine and 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 has added it to the monitoring list for the *Unregulated Contaminant Monitoring Rule*. The notification level for NDMA and two other nitrosamines is 0.01 µg/L. In 2006, OEHHA published a PHG for NDMA at 0.003 µg/L. In 2025, OEHHA proposed a draft updated PHG of 0.0005 µg/L and it is being further considered by DDW.

Pharmaceuticals and Personal Care Products

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. From 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 (San Diego RWQCB, 2020). Additional research is needed on monitoring methods, health effects, and the fate and transport of these constituents. In addition to membrane filtration, the treatment process at the Water Authority's Twin Oaks Valley WTP uses both ozone and granular activated carbon which have been demonstrated to effectively remove pharmaceuticals from drinking water.

Microplastics

In September 2018, SB 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 one and less than 5,000 micrometers (SWRCB, 2025). In 2020 and 2021, the SWRCB worked 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. The review determined that there was insufficient evidence at that time to develop health-based thresholds.

In 2022, the SWRCB adopted the *Policy Handbook Establishing a Standard Method of Testing and Reporting of Microplastics in Drinking Water* (Handbook), pursuant to SB 1422 (2018). The Handbook outlines an iterative, two-phase monitoring framework over a four-year implementation period. Phase I focuses on characterizing the occurrence and concentrations of microplastics in source waters (untreated drinking water supplies), while Phase II expands monitoring efforts to treated drinking water systems. The SWRCB is currently conducting additional research and addressing logistical and technical considerations—such as laboratory accreditation, sampling methodologies, and data reporting protocols—prior to initiating the monitoring phases statewide.

1,2,3-Trichloropropane

1,2,3-Trichloropropane (TCP) is a human-made chemical found at industrial or hazardous waste sites and has been found in groundwater and drinking water supplies. TCP has been used as a cleaning and degreasing solvent and with pesticide products. It is a probable human carcinogen. TCP has primarily been found to impact drinking water in the Central Valley and treatment is conducted via granular activated carbon filtration. There is no federal MCL for TCP. In 2017, the SWRCB adopted an MCL of 0.005 µg/L and required water agencies to conduct monitoring. Neither the Water Authority nor Metropolitan have detected TCP through their respective water systems.

7.3 Colorado River

The Colorado River is the primary imported water source for the Water Authority. High salinity concentrations (TDS), uranium, and perchlorate contamination represent the primary areas of concern in Colorado River water quality (see Section 7.2, *Background on Key Water Quality Constituents*) for explanation of how these water quality constituents can impact water supplies). Managing the Colorado River watershed has been the most effective method for controlling these elements of concern.

Water quality issues are discussed below in order of their magnitude for this water supply source.

7.3.1 Salinity

Salts 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 at Parker Dam, where the San Diego region's river supplies are diverted, has averaged between 537-760 mg/L since 1970 (USBR, 2025). Salinity is variable depending on hydrologic conditions. During the high-water flows from 1983 to 1986, salinity in the Colorado River dropped to a historic low of 525 mg/L. However, during the 1987-1992 drought, higher salinity concentrations returned. High TDS concentrations in water supplies lead 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 2010-2014, the TDS concentrations in Lake Havasu in Arizona and Lake Mathews in Riverside County ranged from 570-640 mg/L. These lakes contain 100% Colorado River water. TDS concentrations in Lake Havasu were measured at 683 mg/L in December 2023 and 619 mg/L in December 2024. 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 its 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 SWP to achieve 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, the seven Basin states that use Colorado River water formed the Colorado River Basin Salinity Control (CRBSC) Forum in 1973. The CRBSC Forum coordinates salinity control efforts among the seven Colorado River Basin states and works with federal agencies to implement the CRBSC Program to prevent a portion of the naturally abundant salt supply from moving into the river system. The CRBSC 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 (PVU). The PVU has been a key salinity control project in the Colorado River's Upper Basin despite operating at reduced capacity due to seismicity concerns. The PVU is one of the original salinity control projects authorized for construction under the Salinity Control Act and is composed of a series of brine collection wells that extract brine groundwater to prevent it from entering the Dolores River, a major Colorado River tributary. The extracted brine groundwater is injected under high pressure, deep underground. The PVU prevented approximately 100,000 tons of salt from entering the river annually until its unplanned closure in March 2019 due to significant seismic activity. PVU operations resumed on an interim basis in June 2022 at two-thirds of capacity, providing approximately 65,000 tons of annual salinity control. Reclamation has not reported any significant seismic activity to date; however, the PVU is reaching the end of its useful life.

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 salt from the Colorado River water annually, resulting in reduced salinity concentrations in the Lower Colorado River Basin of approximately 100 mg/L as a long-term average (Reclamation, 2025).

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 (USEPA, 2016). 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 Willow Beach, Arizona, approximately 11 miles downstream of Hoover Dam, has decreased significantly from a peak of 9.7 µg/L in June 1999 to1 µg/L in 2019 (as compared to the California MCL of 6 µg/L).

7.3.3 Uranium

Naturally occurring uranium is continually present in Colorado River water, reported under state MCL of 20 pCi/L at Metropolitan's Colorado River intake. Uranium impacts to water quality have been identified from upstream mining in Moab, Utah, and other potential mining sites in the western United States. Currently, the United States Department of Energy is actively planning to remove mine tailings, and through April 2025, has disposed over 15.5 million tons, or 97% of the estimated 16 million tons, of uranium tailings from the banks of the Colorado River. This will improve groundwater quality on the Colorado River watershed near Moab, with completion of cleanup anticipated in 2029 (USDOE, 2023). Current levels at Metropolitan's intake water have ranged from 1 to 6 pCi/L, below the MCL. Potential future impacts to water quality include new mining operations and expansion of nuclear fuel production if developed in proximity to the Colorado River. In January 2012, a 20-year moratorium on new uranium mining claims went into effect and remains in place (Metropolitan, 2021).

7.3.4 Nutrients

The Colorado River system has historically been low in nutrients, however new population growth in watershed areas has created a concern for these constituents. 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 historically low nutrient level has been important for blending with SWP water to reduce nutrient levels delivered to retail water agencies and cities that supply water directly to consumers in the San Diego region.

7.3.5 Invasive Mussels

In January 2007, quagga mussels were found in the lower Colorado River basin, and zebra mussels were found in the upper Colorado River basin in July 2024. These invasive species pose significant challenges to water quality and infrastructure along the Colorado River. Quagga and zebra mussels have dense populations which can alter aquatic ecosystems by filtering large volumes of water,

removing phytoplankton, and disrupting the natural food web. This filtering can increase water clarity but may also lead to excessive aquatic plant growth and changes in nutrient cycling. Quagga and zebra mussels can rapidly colonize hard surfaces, including intake structures, pipelines, and treatment facilities, leading to increased maintenance costs and operational disruptions (CDFW, 2025). These impacts can complicate treatment processes, reduce conveyance efficiency, and require additional monitoring and control measures to maintain reliable water delivery and quality. Metropolitan implements a multi-layered approach to control quagga and zebra mussel proliferation in the Colorado River Aqueduct, including chemical control through chlorine injections, physical removal during annual shutdowns, and detection and monitoring of mussel larvae. Metropolitan also implements a boater education and inspection campaign at Diamond Valley Lake marina to protect water quality and infrastructure at the lake.

In 2024, the invasive golden mussel was detected in the Sacramento-San Joaquin Delta. Like quagga and zebra mussels, golden mussels pose a significant threat to the ecological health of reservoirs, water intake and conveyance systems, and water quality. However, golden mussels can survive in a wider range of conditions than quagga or zebra mussels (California State Parks, 2025). The state has developed comprehensive plans to prevent further introduction and spread of invasive mussels, as well as to contain and suppress infestations to minimize their impacts. In collaboration with the DWR, Metropolitan conducts routine monitoring of its water systems and additional SWP sites. In October 2025, Metropolitan detected golden mussel veligers (the mussel's free-floating larval stage) in its system in the influent to the Mills Treatment Plant (Metropolitan, 2025). Metropolitan and other agencies are monitoring water systems and assessing mussel control strategies.

7.3.6 Arsenic

Arsenic is another naturally occurring element monitored by drinking water agencies. Between 2010 and June 2025, arsenic concentrations in Metropolitan's Colorado River source water range from 1.9 to 3.7 µg/L (Metropolitan, 2026). Increasing coagulant doses at water treatment facilities can reduce arsenic concentrations for retail water deliveries.

7.3.7 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 (Pacific Gas & Electric Company, 2025). 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 SWP 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 suitability for drinking and recycling water supplies (Metropolitan, 2021).

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

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

In 2013, the Delta Stewardship Council released *The Delta Plan*, which includes policies and recommendations to achieve "coequal goals," of providing more reliable water supply for the state while also protecting, restoring, and enhancing the Delta ecosystem (Delta Stewardship Council, 2013). In 2016, USBR and DWR developed 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 the state water resilience portfolio approach) referred to as the Delta Conveyance Project, with intakes in the north Delta. By moving the intakes upstream, the project intends to improve water quality for south-of-Delta exporters 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. In 2024, DWR certified the project EIR, and project permitting is expected to be complete by the end of 2026. Implementation of the Delta Conveyance Project will require broad support and funding commitments to implement.

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

7.4.1 Total Organic Carbon and Bromide

A key water quality issue for the SWP is DBPs, particularly from TOC and bromide. TOC and bromide are naturally occurring in water, but concentrations increase several-fold in SWP 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, and 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 supplies to DBP standards is accomplished by different methods:

- Metropolitan's treatment facilities serving the San Diego region have upgraded to the use of ozone as a primary disinfectant to treat challenging water sources, such as SWP supply, and continue to meet DBP standards.
- Some local treatment facilities use chlorine dioxide as a primary disinfectant to reduce DBP formation.

- Blending of SWP source water with Colorado River water reduces precursors and DBP formation.

7.4.2 Nutrients

SWP 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 SWP water supply. Water agencies receiving Delta water have been engaged in efforts to minimize the effects of nutrient loading from Delta wastewater plants. Sacramento Area Sewer District, the primary wastewater discharger to the Sacramento River, completed treatment facility upgrades in 2023 to comply with its 2010 discharge requirements for ammonia and nitrate removal. In 2014, the city of Stockton Regional Wastewater Control Facility, a significant discharger to the San Joaquin River, was issued waste discharge requirements with more stringent nitrogen limits. In 2023, the city of Stockton completed the upgrades needed to meet new nitrogen limits.

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 algal and aquatic weed growth during drought. Consumers may notice changes in the taste and odor of their water due to Delta nutrients depending 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 algal-related problems, taste, and odor events. 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 SWP 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 (Metropolitan, 1999). Because of this lower salinity, Metropolitan blends SWP water with high-salinity Colorado River water to reduce salinity in delivered water. However, both supply and TDS concentrations in SWP 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 SWP supplies.

TDS concentrations in SWP 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 Colorado River water supply. For example, during the 1977 drought, the salinity of SWP 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 Colorado River Aqueduct.

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 *State Water Project Water Supply Contract*, which specifies a 10-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 2015 and 2021, a temporary rock barrier was installed in False River to help limit salt intrusion from the San Francisco Bay into the central Delta during those periods of drought emergency. The Delta Conveyance Project is designed to reduce salinity in SWP supplies by diverting a greater percentage of flows from the lower salinity Sacramento River (Metropolitan, 2021).

7.4.4 Arsenic

Between 2010 and 2025, arsenic concentrations in SWP water have ranged from non-detect to 6.8 µg/L. Increasing coagulant doses at WTPs can reduce arsenic levels for retail deliveries. Some of Metropolitan's SWP 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 SWP 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 4.4 µg/L between 2010 and June 2025 (Metropolitan, 2026).

7.4.5 1,2,3-Trichloropropane

1,2,3-TCP is a human-made carcinogenic chemical that has contaminated groundwater throughout the state, primarily in the Central Valley. In December 2017, SWRCB established an MCL of 0.005 µg/L. There have been no TCP detections in Metropolitan's source water, but some of Metropolitan groundwater storage programs in the Central Valley that can move water into the California Aqueduct have been affected. After detection of TCP above the MCL in groundwater wells in Kern County, Metropolitan 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 SWP and Colorado River, and to capture local watershed runoff. Several Water Authority member agencies are planning to develop local reservoirs to support potable reuse through reservoir augmentation (refer to Section 5.5, *Potable Reuse Supply*, for more information).

Water quality in the San Diego region is influenced by a variety of factors, depending on the source. As discussed above, regional surface water and groundwater quality is vulnerable to degradation resulting from increasing urbanization in the watershed, agriculture and 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 water quality results in higher treatment costs and challenges to downstream utilities, who must reliably treat water to meet drinking water standards. Downstream treatment facilities 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 member agencies work together to improve watershed awareness and management. Currently, the most significant water quality issue that affects the public is algal blooms, which can create taste and odor problems, or generate algal toxins. Algal 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 service area with surface water sources have good, long-standing working relationships with DDW.

A similar requirement from EPA 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. The EPA also requires utilities to complete a source water assessment that uses information collected in sanitary surveys. Source water assessments are 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 the state. 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 includes suggestions for how to protect water quality at the water source.

Monitoring key constituents in source water supplies 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 impact of urban and agricultural runoff on receiving water quality is a statewide and nationally recognized problem. Water Authority staff work with member agencies on reservoir water quality issues through recurring monthly operating heads meetings.

The San Diego RWQCB has regulatory authority to protect local water supplies from impacts caused by pollutants in runoff; the RWWCB's "Practical Vision" prioritizes achieving a sustainable local water supply (San Diego RWQCB, 2023). Water Authority staff are 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

FY 2021 by the cities of San Diego, Del Mar, Escondido, Poway and Solana Beach, and the County. The San Dieguito Water Quality Improvement Plan (WQIP) 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 formed a RWMG to coordinate development of an IRWM Program for the San Diego region. An important element of the IRWM Program is to protect and enhance local surface water quality in the region. 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.

A 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 water quality standards by managing runoff from all sources within the region through the watershed management framework in the San Diego region (refer to Chapter 8, *Integrated Regional Water Management Planning*, for more information).

DWR has provided funding for projects through the 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. Completed IRWM Program -funded projects have assessed water quality in the reservoir and impacts from urban and agricultural runoff and developed projects to help solve water quality challenges. For example, IRWM Program grants provided funding for a hypolimnetic aeration system in Hodges Reservoir and funded construction of wetlands that help capture and treat urban runoff.

7.6 Groundwater

Groundwater quality plays a critical role in determining the reliability of local water supplies in the San Diego region. Several water quality parameters can influence the suitability of groundwater, including elevated levels of salinity and nutrients, which may result from agricultural runoff or seawater intrusion. Naturally occurring constituents such as iron and manganese can also affect water aesthetics and treatment requirements. In addition, synthetic contaminants like methyl tertiary butyl ether (MTBE), a gasoline additive, and PFAS, a group of persistent industrial chemicals, pose emerging challenges for groundwater management. Local agency water boards issue permits for activities that may impact groundwater quality based on the type of discharge and impact to water quality. Permitted programs include irrigated agricultural lands, land disposal, and septic systems. Groundwater is also regulated under the state-enacted SGMA, which requires medium- and high-priority groundwater basins to me managed by DWR-approved GSA(s) through implementation of GSPs to achieve sustainable groundwater conditions by 2040. DWR identifies “critical overdraft” conditions where continued groundwater extraction under current practices would likely result in significant adverse environmental, social, or economic impacts, such as seawater intrusion or chronic lowering of groundwater levels (DWR, 2020). Monitoring and mitigating these constituents are essential to ensure the long-term sustainability and quality of groundwater resources in the San Diego region.

7.6.1 Salinity

Increased TDS concentrations in groundwater basins occur either when basins near the ocean are over drafted, which leads to seawater intrusion, or when agricultural and urban return flows add salts to a basin. Much of the water used for agriculture or urban irrigation infiltrates soil which then percolates into a basin aquifer. Where high-TDS irrigation water is used or where the water transports salts from overlying soil, percolated water increases 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 water supply (refer to Section 5.3, *Groundwater*, for more information about groundwater recovery projects).

To protect water quality in regional 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 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, 2025).

7.6.2 Nutrients

Nutrients, specifically nitrates, 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 lower nitrate sources. To protect groundwater quality, the state Recycled Water Policy requires salt and nutrient management planning (SWRCB, 2018). Local agency water boards have regulatory authority to require recycled water project proponents to develop salt and nutrient management plans to help address the potential for recycled water use to impact groundwater quality. The most effective management will include participation from basin-wide stakeholders, 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 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. See Section 7.2.9, *Constituents of Emerging Concern*, for more discussion. 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

Under SGMA, local water agencies are required to form GSAs and develop GSPs for high- and medium-priority basins to achieve long-term groundwater sustainability. Three DWR-designated basins are located in the Water Authority service area, including the medium-priority San Luis Rey Valley Basin and San Pasqual Valley Basin, and the high-priority Borrego Valley Basin (DWR, 2020).

Ensuring basin sustainable yield can help prevent water quality degradation (for more information on SGMA see Section 5.3.4, *Sustainable Groundwater Management Act*).

7.7 Recycled Water

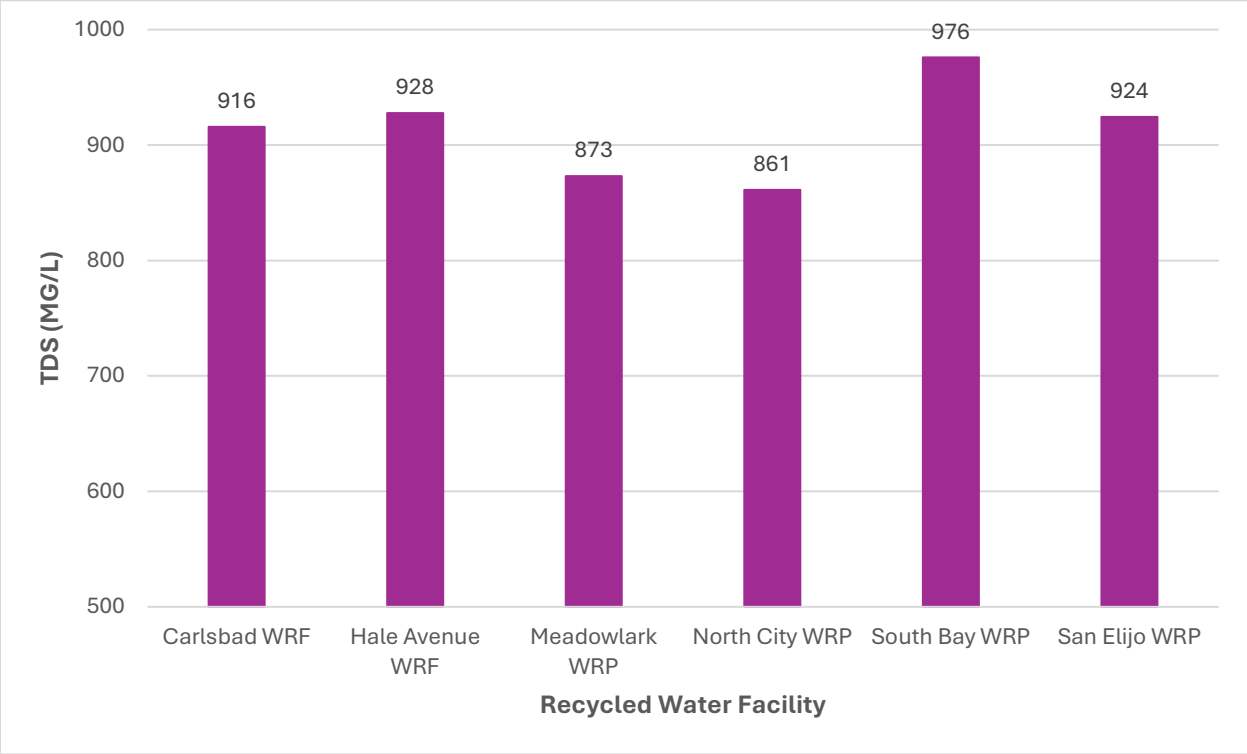
Salinity is a significant implementation issue for recycled water projects.

7.7.1 Salinity

Elevated concentrations of TDS in source water present a significant challenge for water recycling facilities, as treatment technologies are primarily designed to remove suspended solids, not dissolved constituents such as TDS. Demineralization, the process of TDS removal from water, requires an advanced treatment process which can increase project costs significantly.

Residential use of water typically adds 200-300 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 can 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 are problematic for irrigation and industrial reuse customers. This issue 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 (SAWPA, 2010).

Figure 7-1 Average TDS (mg/L) at Recycled Water Facilities (CY 2020 – CY 2025)



Source: SWRCB, 2026

The state 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 basin-wide stakeholders to engage in development of plans to identify 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 local water 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.

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 2023 to June 2024, feedwater salinity for the Carlsbad Desalination Plant had a TDS concentration average of approximately 34,000 mg/L and ranged from 23,000-38,000 mg/L. To address TDS concentrations at these high levels, the desalination facility uses a reverse osmosis (RO) membrane treatment process to reduce TDS to less than 350 mg/L, 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 blended water varies seasonally, depending on imported water blends from Metropolitan (i.e., the proportion of SWP and Colorado River water).

Only one member agency, Vallecitos Water District, has a direct connection to the Carlsbad Desalination Plant pipeline delivering 100% desalinated seawater. Most other member agencies purchasing treated water from the Water Authority receive a variable blend of desalinated water and imported water. The blend of desalinated water depends on system operations and water demands, and can vary throughout the day, month, or seasonally.

Prior to the RO process, feedwater from the Pacific Ocean is pretreated to remove suspended solids, including organic material. The RO process removes dissolved solids, and the resulting product water is post-treated to prevent corrosion in the distribution system and improve aesthetic quality. This post-treatment typically includes the addition of alkalinity. A final disinfection step ensures a residual disinfectant is maintained in the treated water.

In 2023, the *Carlsbad Desalination Plant 2019-2023 State of the Ocean Report* presented compiled findings from the plant's robust receiving water monitoring program (Poseidon Water, 2023). The monitoring program evaluates how the plant's seawater discharge interacts with the surrounding marine environment. The report found no evidence of impacts to water quality or marine conditions beyond the designated brine mixing zone and confirmed that the plant remains in full compliance with all applicable regulations and permit requirements. It also recommended continued monitoring and reporting to ensure ongoing environmental protection.

In 2024, the *Carlsbad Desalination Integration and Regional Salinity Reduction Study* evaluated the integration of desalinated water supply in the Water Authority water system, member agencies' distribution systems, and the San Diego region. The study was built on the 2018 Water Research Foundation's *Carlsbad Desalinated Seawater Integration Study*, which assessed water quality in the Water Authority's water system and member agency distribution systems from 2014-2016. The 2024 study focused on gathering water quality data from 2017-2019 under varying blended water conditions and expanded the scope to assess regional salinity reduction and economic impacts associated with desalinated water use.

The 2024 study captured a broader range of imported water compositions - particularly the varying proportions of SWP and Colorado River water - and assessed the long-term water quality impacts of blended supplies. Key conclusions included the critical influence of imported water composition on desalinated water blending effects, successful mitigation of chloramine residual decay through strategic blending and disinfection practices, and no observed increase in corrosion risks.

7.9 Potable Reuse

Several Water Authority member agencies are developing or considering potable reuse projects as part of their long-term water supply strategies. Potable reuse projects utilize highly treated effluent from wastewater treatment facilities as a source water, necessitating the implementation of advanced purification technologies - such as microfiltration, reverse osmosis, and advanced oxidation - to meet stringent public health standards and ensure the reliability and quality of potable water supplies.

Wastewater contains a variety of constituents that may impact water quality, including pathogenic microorganisms, regulated chemical contaminants with established MCLs, and CECs. Additionally, wastewater includes total TOC, which, if not properly managed during treatment, can contribute to the formation of DBPs that pose potential health risks.

To ensure potable reuse projects protect public health, SWRCB adopted regulations establishing treatment criteria for indirect and direct potable reuse. Potable reuse projects rely on source control programs, multiple treatment barriers, and monitoring to confirm removal of pathogens and chemical constituents from the water supply. Potable reuse projects implement advanced water treatment techniques such as RO and advanced oxidation processes to remove pathogens and CECs that are likely present in wastewater. Advanced treated water produced through potable reuse projects may undergo further treatment at a downstream surface water treatment facility, which provides a significant pathogen barrier to further enhance reliability of drinking water supplies.

Advanced treated water will be different in quality from raw water currently supplied to local surface water treatment plants from the Colorado River, SWP, and local water 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 the water source(s) supplied.

7.9.1 CECs

CECs in potable reuse include a wide range of naturally occurring and synthetic chemicals such as pharmaceuticals, personal care products, and industrial compounds that may be present at trace levels in municipal wastewater. Advanced treatment processes provide a significant barrier to CECs. The treatment process produces a brine waste stream that may contain concentrated CECs. The concentrated brine must be properly managed to prevent potential impacts to aquatic life from discharges to surface water.

The SWRCB requires potable reuse projects that rely on advanced treatment for indirect or direct potable reuse to develop and implement a CEC Monitoring Plan approved by DDW. SWRCB establishes monitoring requirements based on recommendations from experts with input from various interested parties including water and wastewater agencies. In 2017, SWRCB convened a Science Advisory Panel to provide updated recommendations for monitoring CECs in recycled water. In 2018, the panel released a final report recommending CEC monitoring include a screening framework for potable reuse projects that incorporates bioanalytical tools known as “bioassays.” The SWRCB incorporated these recommendations as requirements the 2018 state amended Recycled Water Policy. To assist agencies in complying with the new bioanalytical monitoring requirements, WateReuse California and National Water Research Institute released a guidance document in January 2020 for water agencies to use in developing standard operating procedures for new bioanalytical tools used in potable reuse projects.

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

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Chapter 8: Integrated Regional Water Management Planning

8.1 Introduction

As part of the UWMP Act, urban water suppliers are encouraged to coordinate with regional water management efforts, including IRWM planning. While not required, inclusion of IRWM efforts demonstrates alignment with statewide water management goals. Consistent with Water Code Section 10620(d)(3), the Water Authority coordinated with regional agencies and stakeholders in preparing the UWMP. As a water supply wholesaler, the Water Authority has opted to include this information in the 2025 UWMP as a critical component of supporting reliable and sustainable water supplies in the San Diego region.

In 2002, the Regional Water Management Planning Act (Senate Bill 1672) was formally established through state legislation to implement the IRWM program in response to growing recognition that the state's water challenges—such as drought, flooding, water quality degradation, and ecosystem decline—could not be effectively addressed through fragmented, single-agency approaches. IRWM planning involves coordinating and integrating water planning activities within a defined region to improve and maintain the 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 entities. IRWM planning is also a mechanism to achieve goals established through IRWM planning efforts through grant funding eligibility. The DWR has awarded approximately $2 billion to support IRWM planning and implementation in the 48 recognized IRWM planning regions in California through three voter-approved bond measures between 2002 and 2021. Since 2002, IRWM planning efforts have been a featured element of the state's *California Water Plan* five-year updates (DWR, 2023). The *2023 California Water Plan Update* recommends advancing IRWM and sustainability across the state.

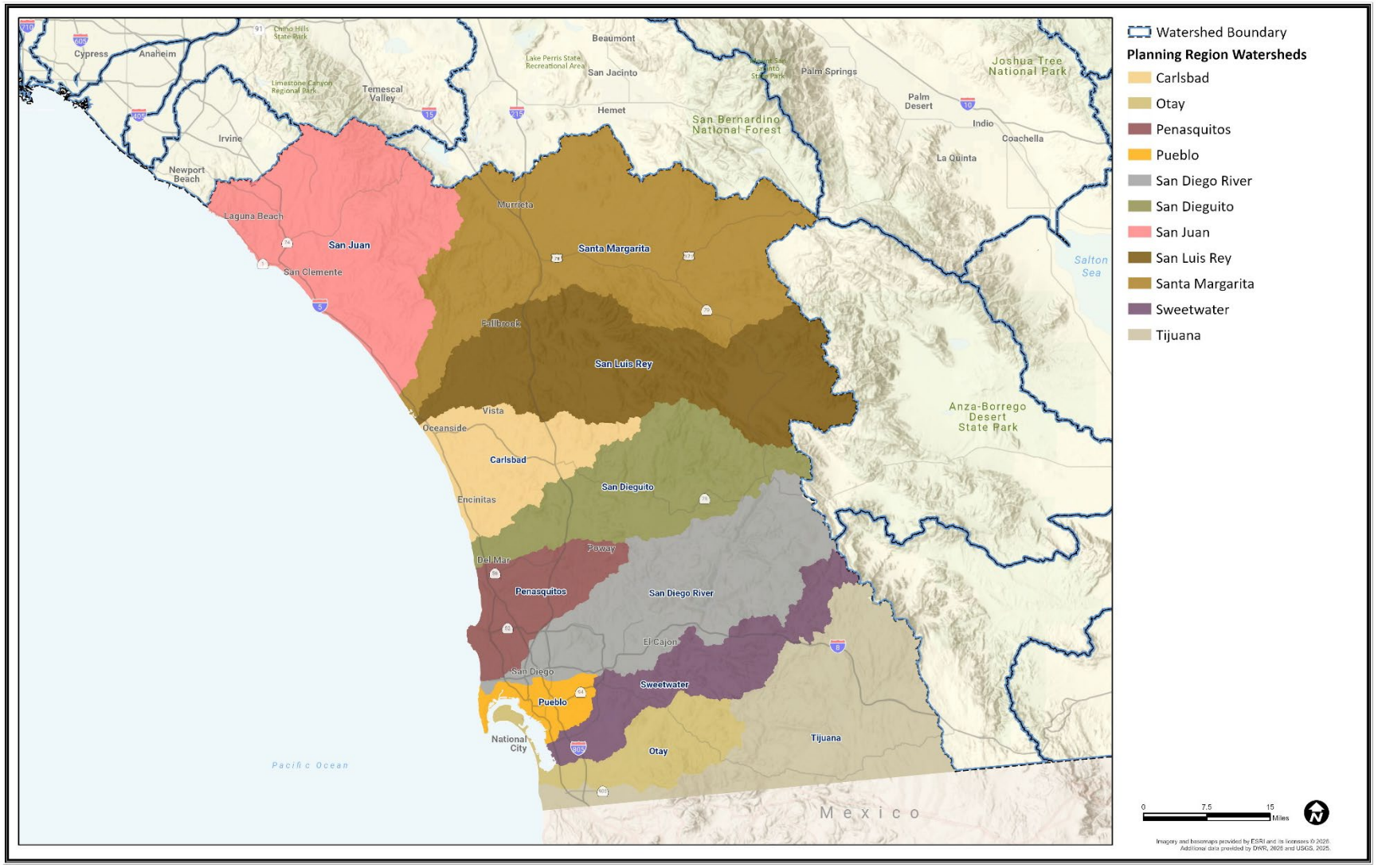
8.2 Background and Working Groups

8.2.1 Regional Water Management Group

In 2005, the Water Authority, City of San Diego, and San Diego County formed a RWMG to implement the principles of IRWM planning established by the Regional Water Management Planning Act. The RWMG established the San Diego IRWM Program to address the key goals of preparing IRWM plans and updates, such as supporting regional self-reliance, multi-benefit projects, cross-jurisdictional collaboration, access to state funding, and inclusive decision making.

In 2007, the San Diego IRWM Plan defined the San Diego IRWM planning region as the watersheds that are tributary to coastal waters (Figure 8-1). Since formation of the RWMG, the San Diego IRWM Program has secured over $132 million in state funding supporting 84 projects that address drought resilience, disadvantaged community needs, habitat restoration, and infrastructure improvement (San Diego RWMG, 2025).

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



8.2.2 Regional Advisory Committee

In 2005, the RWMG formed a Regional Advisory Committee (RAC) to support development of the San Diego region's first IRWMP to support updates to regional planning information and identify priorities in IRWMP plan updates. The RAC also advises the RWMG regarding project selection for funding applications and provides diverse representation to the San Diego IRWM Program from various functional areas related to water management, including water supply, water quality, wastewater, natural resources, watersheds, stormwater, Underrepresented Communities (URCs), flood management, business, agriculture, tribes, and land use planning.

8.2.3 San Diego IRWM Program Workgroup

A San Diego IRWM Program Workgroup comprised of volunteers from local public agencies, tribal entities, and non-profit organizations (NGOs) was established in 2021. This workgroup was formed to support URCs in the region by recommending changes to San Diego IRWM Program processes to encourage participation in IRWM activities, identifying barriers to access and capacity gaps, and ensuring that project selection for grant funding is inclusive and community informed.

In 2021, the San Diego IRWM Program workgroup successfully selected four projects with URC benefits that were awarded $5 million in state funding through the Urban and Multibenefit Drought Relief Grant Program. This funding provided interim and immediate relief in response to drought-related impacts, aligning with the goals of the Budget Act of 2021 and the San Diego IRWM Program’s commitment to balanced resource distribution.

8.3 Integrated Regional Water Management Plan and Updates

The original 2007 San Diego IRWM Plan and subsequent updates 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 (City of San Diego, County of San Diego, and Water Authority, 2007; 2013; 2019). 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 San Diego IRWM Plan established the following 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 San Diego IRWM Plan also presents 10 regional objectives and associated metrics. More information on the San Diego IRWM Plan is available online (https://sdirwmp.org/irwm-planning).

8.4 Grants and Funding

Since 2008, DWR has awarded 11 IRWM grants totaling $132.8 million to recipients throughout the San Diego IRWM planning region; see Table 8-1.

Table 8-1 IRWM Grant Awards to San Diego Region[a]

Funding Source	Date Awarded	Grant Award ($ millions)	Projects Funded[b]	Projects Completed	Grant Billed to DWR ($ millions)
Proposition 50	2008	25	18	18	24.9
Proposition 84, Plan Update	2011	1	1	1	1
Proposition 84, Round 1	2011	7.9	11	11	7.9
Proposition 84, Round 2	2014	10.5	7	7	10.5
Proposition 84, Round 3	2014	15.1	7	7	15.07
Proposition 84, Round 4	2016	31.1	13	13	30.2
Proposition 1, Plan Update	2017	0.25	1	1	0.25
Proposition 1, Disadvantaged Community Involvement Program	2017	5.6	9	9	5.4
Proposition 1, Round 1	2020	15.3	7	1	10.9
2020 Urban and MultiBenefit Drought Relief (Drought Relief)	2021	5.0	4	2	0.95
Proposition 1, Round 2	2022	16.0	6	0	0.86
Total		**132.8**	**84**	**70**	**107.9**

[a] Data shown here as of May 2025

[b] Number of projects not including grant administration and needs assessment

Combined, the grants summarized above have supported 84 multi-benefit implementation and IRWM Plan update projects, as well as one needs assessment, all sponsored by public agencies, tribal entities, and NGOs. Of the total funding, $88.1 million has been allocated to support 14 projects sponsored by the Water Authority, 30 projects sponsored by Water Authority member agencies, and grant administration for all projects. Figure 8-2 provides an overview of benefits associated with the IRWM grants.

The Water Authority has an additional role in the San Diego IRWM Program. In 2005, an MOU established by the San Diego RWMG designated the Water Authority as the lead agency for purposes of applying for grants, approving funding agreements, administering grant funding, and representing the RWMG to funding agencies. The Water Authority administers grant funds for all projects with respect to reporting progress, submitting invoices to DWR and distributing funding to project sponsors, and ensures compliance with funding agreements. This responsibility requires the Water Authority to contract directly with all project sponsors except those sponsored by the Water Authority. To offset these administrative costs, the Water Authority receives up to 6% of the IRWM Program grant funds awarded to the San Diego region, as well as supplemental funding from project sponsors for any additional support required.

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



The San Diego IRWM Program supports UWMPs by promoting regional planning and funding projects that aim to increase water supply reliability and improve surface water and groundwater quality in the San Diego region. IRWM planning and funding help support 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 2025 UWMP as part of the San Diego region's projected mix of water resources. The San Diego IRWM Program also aids water-use efficiency activities, which is a key element of this 2025 UWMP. Figure 8-3 highlights three sample projects funded through the San Diego IRWM Program.

Figure 8-3 Examples of IRWM Projects



2020 Regional Water Use Efficiency Programs project, sponsored by the Water Authority, aims to reduce water demand by implementing various water-use efficiency measures by water-users in the San Diego region.



The East County Advanced Water Purification Program, a collaborative effort between Padre Dam Municipal Water District, the City of El Cajon, the County of San Diego and Helix Water District, is expected to provide a new and clean water source for San Diego's East County residents.

The San Diego IRWM Program is anticipated to evolve as a more comprehensive Watershed Resilience Program, aligned with the state's increasing need for climate adaptation through integrated, watershed-scale, and multi-sector collaboration. This transition highlights the importance of coordinated investment in both natural and built infrastructure, advancing regional fairness and balanced participation, and aligning with broader state climate resilience strategies. For the San Diego IRWM region, this progression presents a critical opportunity to strengthen regional resilience; however, its future remains uncertain and contingent upon consistent funding and sustained policy support. Mapping the future of the program that aligns with the San Diego region's objectives is ongoing. Achieving the vision of watershed resilience - through inclusive, locally driven, and adaptive approaches - will require long-term commitment from both state and regional stakeholders.

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Chapter 9: Water Supply Reliability

9.1 Introduction

Assessment of water supply reliability must include a comparison of total projected water supply and demands over the next 20 years (2030-2050) in five-year increments under normal year conditions, single dry-year conditions, and multiple dry-year conditions. Verifiable water supplies are those included in Water Supply Assessments (WSAs) and verifications prepared by retail water agencies. The supply information presented herein is used by San Diego County and cities in the San Diego region when making project-based land use decisions regarding available water supplies for growth as required SB 221 and SB 610. Projects with adequate documentation regarding implementation and water supply use, or existing projects already planned for expansion, are included in the supply availability assessments discussed in Section 9.3, *Normal Water Year Assessment*, and Section 9.4, *Dry Water Year Assessments,* of this 2025 UWMP.

This chapter includes information about the Water Authority's water demands and supplies and summarizes the Water Authority's water supply reliability assessment. Reliability assessment results for scenarios including normal year, single dry-year, and multiple dry-year conditions demonstrate that even when making conservative assumptions about the availability of dry-year water supplies from Metropolitan, the San Diego region's water resource mix is drought resilient. The Water Authority's DRA is provided in Section 9.6, *Drought Risk Assessment*.

9.2 Development of Projected Water Resources Portfolio

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

- Member agency projected water recycling, potable reuse, groundwater, desalination, water transfer, and surface water supplies (see Chapter 5, *Member Agency Supplies*)
- Continued regional water use efficiency (see Chapter 3, *Demand Management*)
- Water Authority Board approvals made in regard to its water supplies are listed below (see Chapter 4, *Water Authority Supplies*, and Chapter 11, *Water Shortage and Drought Planning*):
    - Agreement between Imperial Irrigation District and the Water Authority for transfer of conserved water, and other related agreements (see Section 4.2*, Water Authority-Imperial Irrigation District Water Conservation and Transfer Agreement*)
    - Agreements associated with the All-American Canal and Coachella Canal Lining Projects, and other related agreements (see Section 4.3, *All-American Canal and Coachella Canal Lining Projects*)
    - Water Purchase Agreement between the Water Authority and Channelside Water Resources for access to desalinated water produced at the Carlsbad Desalination Plant (see Section 4.5, *Carlsbad Desalination Plant*)
    - Acceptance of San Vicente Dam Raise Project (i.e., emergency and carryover storage) as complete (see Section 11.4.1, *Water Authority Carryover Storage Program*)
    - Approval of the Water Authority's 2024 Water Facilities Master Plan (Water Authority, 2025) (see Section 1.6.4, *Capital Improvement Program*)

- Exchange agreements with Western Munucipal Water District and Eastern Municipal Water District (see Section 2.3, *Out-Of-Region Exchanges*)

9.3 Normal Water Year Assessment

Table 9-1, below, shows a normal water year assessment with an overview of the Water Authority's projected water demands through 2050, along with the water supplies necessary to meet these demands under normal conditions. Section 2.5, *Projected Water Demands*, presents normal-year water demand projections, which also inform Table 9-1. As shown below, no water supply shortages are anticipated during normal water year conditions through 2050.

Table 9-1 Normal Water Year Supply and Demand Assessment (AFY)[a]

	2030	2035	2040	2045	2050 [b]
Water Authority Water Supplies					
IID Water Transfer	200,000	200,000	200,000	200,000	200,000
AAC and CC Lining Projects	77,700	77,700	77,700	77,700	77,700
Carlsbad Desalination Plant	42,000	42,000	42,000	42,000	42,000
Sub-Total	**319,700**	**319,700**	**319,700**	**319,700**	**319,700**
Member Agency Water Supplies (Verifiable)					
Surface Water	42,439	46,056	47,740	47,740	47,740
Water Recycling	34,207	34,463	34,702	34,872	35,042
Groundwater	20,610	20,610	20,610	17,110	17,110
Brackish Groundwater Recovery	9,650	9,290	9,290	9,290	9,290
Desalination	6,000	6,000	6,000	6,000	6,000
Potable Reuse	49,842	110,882	110,882	110,882	110,882
San Luis Rey Water Transfers	15,800	15,800	15,800	15,800	15,800
Sub-Total	**178,548**	**243,101**	**245,024**	**241,694**	**241,864**
Total Projected Supplies	**498,248**	**562,801**	**564,724**	**561,394**	**561,564**
Total Long-Range Demand Forecast with Conservation	**481,915**	**490,433**	**499,867**	**504,176**	**509,759**
Metropolitan Water Supplies	–	–	–	–	–
Potential Surplus or (Shortage)	***16,333***	***72,368***	***64,857***	***57,218***	***51,805***

AAC = All-American Canal; AFY = acre-feet per year; CC = Coachella Canal; IID = Imperial Irrigation District; Metropolitan = Metropolitan Water District of Southern California

Notes:

[a] Normal water year demands based on 1991 to 2020 weather; see Chapter 2, *Water Demands*.

[b] Calendar Year 2050 assumes the IID Water Transfer and out-of-region exchange agreements are extended. See Section 10.2.4, *Scenario Analysis: Future Potential Scenarios Based on Critical Uncertainties*, under "Scenario 3: Drought Post IID Transfer Agreement Expiration" for an analysis representing the IID Water Transfer and exchange agreements ending in 2047.

For the reliability assessment, projected water supplies from Metropolitan were considered supplemental and calculated as the increment of supply necessary to meet demands after accounting for member agency supplies and Water Authority supplies. Metropolitan staff provided the Water Authority with estimated demands on Metropolitan that are used to inform their 2025 UWMP, and which demonstrate that supplies are adequate to cover the Water Authority's supplemental need. As presented in Table 9-1, no supplemental water is anticipated to be necessary during normal water year conditions. Metropolitan's estimated demand data are included in Appendix G*, Water Authority Demands Provided by Metropolitan*. These include 2003 QSA supplies delivered under a Water Exchange Agreement with Metropolitan and San Luis Rey Water Transfer as discussed in Section 4.2*, Imperial Irrigation District Conservation and Transfer,* and Section 5.7*, San Luis Rey Water Transfer Supply*.

9.4 Dry Water Year Assessments

The UWMP Act 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 2.5.4, *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 an average of recent (2013, 2018, and 2021) single dry-year supplies. Member agency projected verifiable supplies for recycling, potable reuse, desalination, brackish groundwater recovery, and San Luis Rey water transfer are assumed to experience little, if any, reduction in a dry year. Water Authority conserved water supplies from the Imperial Irrigation District transfer, canal lining projects, and Carlsbad Desalination Plant are also considered drought resilient as discussed in Chapter 4, *Water Authority Supplies*. For this single dry-year assessment, Metropolitan supplies are assumed to be limited to 1.3 MAFY due to dry conditions and reduced deliveries from the SWP (i.e., no Delta improvements) and the Colorado River. In addition, the Water Authority is assumed to receive its preferential water rights 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 continued to maintain and develop as planned, including achievement of the additional conservation target. No shortages are anticipated in the Water Authority's service area under single dry-year conditions.

Table 9-2 Single Dry-Year Supply and Demand Assessment, 2030-2050 (AFY)

	2030	2035	2040	2045	2050[c]
Water Authority Supplies					
IID Water Transfer	200,000	200,000	200,000	200,000	200,000
AAC and CC Lining Transfers	77,700	77,700	77,700	77,700	77,700
Desalination	42,000	42,000	42,000	42,000	42,000
Sub-Total	**319,700**	**319,700**	**319,700**	**319,700**	**319,700**
Member Agency Supplies[a]					
Surface Water	22,225	25,842	27,526	27,526	27,526
Water Recycling	34,207	34,463	34,702	34,872	35,042
Groundwater	18,221	18,221	18,221	14,721	14,721
Groundwater Recovery	9,650	9,290	9,290	9,290	9,290
Desalination	6,000	6,000	6,000	6,000	6,000
Potable Reuse	49,842	110,882	110,882	110,882	110,882
San Luis Rey Water Transfers	15,800	15,800	15,800	15,800	15,800
Sub-Total	**155,945**	**220,498**	**222,421**	**219,091**	**219,261**
Metropolitan Supplies[b]	378,898	385,866	392,834	399,802	406,770
Total Projected Supplies without Storage Takes	854,543	926,064	934,955	938,593	945,731
Total Dry-Year Demand Forecast with Conservation	**510,825**	**519,769**	**529,745**	**534,233**	**540,139**
Potential Surplus or (Shortage)	***343,718***	***406,295***	***405,210***	***404,360***	***405,592***
Utilization of Carryover Storage	–	–	–	–	–

AAC = All-American Canal; AFY = acre-feet per year; CC = Coachella Canal; IID = Imperial Irrigation District; Metropolitan = Metropolitan Water District of Southern California

Notes:

[a] Member agency local supplies include production from verifiable reliable sources, as well as dry-year totals for historic actual surface water and groundwater supplies (an average of 2013, 2018 and 2021).

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California.*

[c] *Calendar Year 2050 assumes the IID Water Transfer and out-of-region exchange agreements are extended.*

9.4.2 Multiple Dry-Year Assessment

Table 9-3 through Table 9-7, presented below and on the following pages, show multiple dry-year assessments in five-year increments as required in the UWMP Act. Under this scenario, 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 to 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 could evaluate if draws from regional storage supplies are required and if there is a 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 Water District Act Section 135 – Preferential Right to Water*, Section 135 of the Metropolitan Water District Act 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 of available Metropolitan water supplies is estimated through 2050, presented in consecutive five-year periods in Table 9-3 through Table 9-7, below. To provide a conservative analysis due to numerous uncertainties associated with identifying Metropolitan's future available supplies and storage capacity, Metropolitan's total available dry-year supplies are assumed to be 1.3 MAF for the first year and 1.2 MAFY for each of the following years under multiple dry-year conditions.

Table 9-3 Multiple Dry-Year Supply and Demand Assessment, 2026-2030 (AFY)

	2026	2027	2028	2029	2030
Member Agency Supplies[a]	153,160	177,600	172,821	153,444	136,635
Water Authority Supplies	319,700	319,700	319,700	319,700	319,700
Metropolitan Supplies[b]	373,324	345,893	347,179	348,466	349,752
Total Estimated Core Supplies without Storage Takes	**846,184**	**843,193**	**839,700**	**821,610**	**806,087**
Total Dry-Year Demand Forecast with Conservation	**515,082**	**521,030**	**527,018**	**533,017**	**539,097**
Potential Surplus or (Shortage)	**331,102**	**322,163**	**312,682**	**288,593**	**266,990**
Utilization of Carryover Supplies	–	–	–	–	–

AFY = acre-feet per year; Metropolitan = Metropolitan Water District of Southern California

Notes:

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

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California.*

Table 9-4 Multiple Dry-Year Supply and Demand Assessment, 2031-2035 (AFY)

	2031	2032	2033	2034	2035
Member Agency Supplies[a]	205,472	197,174	177,609	154,367	197,571
Water Authority Supplies	319,700	319,700	319,700	319,700	319,700
Metropolitan Supplies[b]	380,292	352,325	353,611	354,898	356,184
Total Estimated Core Supplies without Storage Takes	**905,464**	**869,199**	**850,920**	**828,965**	**873,455**
Total Dry-Year Demand Forecast with Conservation	**515,733**	**520,690**	**525,697**	**530,754**	**535,862**
Potential Surplus or (Shortage)	***389,731***	***348,509***	***325,223***	***298,211***	***337,593***
Utilization of Carryover Supplies	–	–	–	–	–

AFY = acre-feet per year; Metropolitan = Metropolitan Water District of Southern California

Notes:

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

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California.*

Table 9-5 Multiple Dry-Year Supply and Demand Assessment, 2036-2040 (AFY)

	2036	2037	2038	2039	2040
Member Agency Supplies[a]	266,405	258,104	238,535	215,289	197,810
Water Authority Supplies	319,700	319,700	319,700	319,700	319,700
Metropolitan Supplies[b]	387,260	358,757	360,043	361,330	362,616
Total Estimated Core Supplies without Storage Takes	**973,365**	**936,561**	**918,278**	**896,319**	**880,126**
Total Dry-Year Demand Forecast with Conservation	**524,767**	**529,815**	**534,913**	**540,062**	**545,262**
Potential Surplus or (Shortage)	***448,598***	***406,746***	***383,365***	***356,257***	***334,864***
Utilization of Carryover Supplies	–	–	–	–	–

AFY = acre-feet per year; Metropolitan = Metropolitan Water District of Southern California

Notes:

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

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California.*

Table 9-6 Multiple Dry-Year Supply and Demand Assessment, 2041-2045 (AFY)

	2041	2042	2043	2044	2045
Member Agency Supplies[a]	266,630	258,315	238,733	215,473	197,980
Water Authority Supplies	319,700	319,700	319,700	319,700	319,700
Metropolitan Supplies[b]	394,228	365,189	366,475	367,762	369,048
Total Estimated Core Supplies without Storage Takes	**980,558**	**943,204**	**924,908**	**902,935**	**886,728**
Total Dry-Year Demand Forecast with Conservation	**534,843**	**539,991**	**545,191**	**550,443**	**555,748**
Potential Surplus or (Shortage)	***445,715***	***403,213***	***379,717***	***352,492***	***330,980***
Utilization of Carryover Supplies	–	–	–	–	–

AFY = acre-feet per year; Metropolitan = Metropolitan Water District of Southern California

Notes:

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

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California*.

Table 9-7 Multiple Dry-Year Supply and Demand Assessment, 2046-2050 (AFY)

	2046	2047	2048	2049	2050 [c]
Member Agency Supplies[a]	266,800	258,485	238,903	215,643	198,150
Water Authority Supplies	319,700	319,700	319,700	319,700	319,700
Metropolitan Supplies[b]	401,196	371,621	372,907	374,194	375,480
Total Estimated Core Supplies without Storage Takes	**987,696**	**949,806**	**931,510**	**909,537**	**893,330**
Total Dry-Year Demand Forecast with Conservation	**539,375**	**544,569**	**549,815**	**555,113**	**560,464**
Potential Surplus or (Shortage)	***448,321***	***405,237***	***381,695***	***354,424***	***332,866***
Utilization of Carryover Supplies	–	–	–	–	–

AFY = acre-feet per year; Metropolitan = Metropolitan Water District of Southern California

Notes:

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

[b] Metropolitan supplies based on preferential rights. See Chapter 6, *Metropolitan Water District of Southern California*.

[c] *Calendar Year 2050 assumes the IID Water Transfer and out-of-region exchange agreements are extended.*

In Chapter 10, *Scenario Planning – Managing an Uncertain Future*, scenarios are presented that modify dry-year supplies available for allocation. The total supply assumes reduced deliveries from the SWP and Colorado River, 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 utilize the single dry-year demand projection preceding the multi-year period as the basis for the start of the dry/hot cycle, then increases demands over the following five years by one percent per year as discussed in Section 2.5.4, *Projected Dry-Year Water Demands*. 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 the Water Authority's and member agencies' demand management measures as they respond to the extended drought conditions.

9.4.3 Demand Hardening

The San Diego region has a long history of adopting and implementing both conservation and supply diversification measures that support regional water supply resilience. These measures have supported the San Diego region in largely meeting state requirements for per capita water use, but prior long-term investments in water use efficiency may make it harder for customers to comply with voluntary or mandatory water restrictions in the future, known as "demand hardening." While no water shortages are anticipated throughout the planning horizon for this 2025 UWMP, demand hardening may influence water conservation dynamics. As per capita water use decreases, the ability to achieve additional savings through voluntary or mandatory measures is significantly reduced. For customers who have already adopted more efficient water-use practices, savings achieved through drought pricing and other general increases may diminish, as essential uses are less responsive to price. Although shortage management measures may not be required, these factors could lead to less flexibility in managing potential water supply gaps. This underscores the value of the Water Authority's investments in diversifying its water supply portfolio to ensure continued reliability and resilience during dry years.

Section 11.4*, Dry Water Year Supplies and Carryover Storage,* discusses the Water Authority's potential dry-year supplies.

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 2025 UWMP on future demands and supplies projected for the San Diego region. Steps being taken by member agencies and Metropolitan to develop water supplies are addressed in their respective UWMPs. Chapter 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 shortages. Section 9.3, *Normal Water Year Assessment,* and Section 9.4, *Dry Water Year Assessment,* 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 2025 UWMPs to provide historical data about water supplies available for these three water year types. Historic total supplies, both local and imported, were based on the following periods: Normal water year supply was based on an average from 1986-2023 (surface water and groundwater); single dry-year supply was based on an average of 2013, 2018, and 2021; and multiple dry-year supply was based on 2011-2015.

Supplies used during a non-allocation dry period could exceed the supplies used during a normal year based on availability. In Section 9.3*, Normal Water Year Assessment*, average local supply production is not based on historical yields, but is 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 will continue to monitor the reliability of existing supplies and the development of identified future supplies through an annual Water Supply and Demand Assessment and five-year updates to the UWMP.

The UWMP Act requires 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 describes, to the extent practicable, plans to replace that water source with alternative sources or demand management measures. As stated throughout this 2025 UWMP, the Water Authority and its member agencies have developed a diverse and reliable water resource portfolio. The unavailability of any one supply source will be buffered by planned diversity in supply as the San Diego region does not rely on a single water source. If a water supply should become unavailable, the Water Authority could work with member agencies to maximize development of recycled water, potable reuse, groundwater, and desalination. A scenario planning process was employed to adequately plan for potential supply uncertainties and is described in Chapter 10, *Scenario Planning – Managing an Uncertain Future*.

9.6 Drought Risk Assessment

Wholesale water suppliers must include a DRA in their UWMPs. The Water Authority's DRA includes a description of the data, methodology, and basis for water shortage conditions, with DRA projections developed for five consecutive dry years. The DRA must also include a reliability determination for each water supply source and compare 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 assessed a projected drought over the five-year period from 2026-2030. The historical period used in the analysis to represent the Water Authority's driest consecutive five-year period is 2014-2018. These 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. Combined production from surface water and groundwater sources ranged from a low of 21,137 AFY to a high of 67,281 AFY.

For each year from 2014-2018, a comparison was made between available water supplies and water demands. For the Water Authority supplies, which consist of the IID Water Transfer, the AAC and CC canal lining projects, and regional desalination, no reduction in water supply availability over the five-year period would occur due to the drought resilience of these supplies. See Chapter

4, *Water Authority Supplies*, for further discussion. The volume of the Water Authority's supplies varies over the five-year period based on actual production during the assessment period of 2014-2018. Additional information on member agency supplies can be found in Chapter 5, *Member Agency Supplies*. For Metropolitan supplies, the volume of water available each year is based on the Water Authority's estimated preferential right to Metropolitan purchases. Additional information on Metropolitan's water supplies is provided in Chapter 6, *Metropolitan Water District of Southern California*.

Once the available water supplies were calculated for each year of the DRA, the total was compared to the projected demands for each year. The demands for 2026-2030 were projected by escalating the 2025 demands of 444,870 AFY over five years using multipliers presented in Table 9-8 and subsequently adding the out-of-region exchanges. 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 water demand forecasting models and used to determine the multipliers for consecutive dry/hot weather.

Table 9-8 Demand Projection Multipliers, 2026-2030

	2026	2027	2028	2029	2030
Multiplier	109%	109%	111%	114%	116%

The data used to calculate the Water Authority's water supply capabilities under the scenario of five consecutive dry years is shown in Table 9-9, below. The multipliers result in a sizable increase in 2026 water demand and incremental increases in demand 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.

Table 9-9 Drought Risk Assessment, 2026-2030 (AFY)

	2026	2027	2028	2029	2030
Water Authority Supplies					
IID Water Transfer	200,000	200,000	200,000	200,000	200,000
AAC and CC Lining Transfers	77,700	77,700	77,700	77,700	77,700
Seawater Desalination	42,000	42,000	42,000	42,000	42,000
Sub-Total	**319,700**	**319,700**	**319,700**	**319,700**	**319,700**
Member Agency Supplies[a]					
Surface Water	20,374	6,004	15,660	51,191	21,730
Water Recycling	26,948	26,948	26,948	26,948	26,948
Groundwater	18,288	15,132	13,602	16,090	15,629
Groundwater Recovery	7,743	7,743	7,743	7,743	7,743
Seawater Desalination	6,000	6,000	6,000	6,000	6,000
Potable Reuse		32,222	46,492	49,842	49,842

	2026	2027	2028	2029	2030
San Luis Rey Water Transfers	15,865	15,865	15,865	15,865	15,865
Sub-Total	**95,218**	**109,914**	**132,310**	**173,679**	**143,757**
Metropolitan Supplies[b]	373,324	345,893	347,179	348,466	349,752
Total Projected Supplies without Storage Takes	788,242	775,506	799,189	841,845	813,209
Total DRA Dry Year Demand Forecast with Conservation	**501,148**	**502,108**	**511,956**	**526,212**	**536,049**
Potential Surplus or (Shortage)	**287,094**	**273,399**	**287,233**	**315,633**	**277,160**
Utilization of Carryover Storage	–	–	–	–	–

AAC = All-American Canal; AFY = acre-feet per year; CC = Coachella Canal; CY = calendar year; DRA = Drought Risk Assessment; IID = Imperial Irrigation District; Metropolitan = Metropolitan Water District of Southern California

[a] Surface water and groundwater values based on lowest most recent five-year average of water use for these sources of supplies (CY 2014-2018). All other local supplies except potable reuse are held constant at actual CY 2025 levels. Table assumes same schedule of Metropolitan total supply ramp-down from multi dry-year scenario.

[b] Metropolitan supplies based on preferential rights; see Chapter 6, *Metropolitan Water District of Southern California.*

9.7 References

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San Diego County Water Authority (Water Authority). 2025. 2024 Water Facilities Master Plan. March. Available: https://www.sdcwa.org/wp-content/uploads/2025/05/2024-Water-Facilities-Master-Plan-1.pdf. Accessed April 2026.

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Chapter 10: Scenario Planning – Managing an Uncertain Future

10.1 Introduction

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 future resource mix reliability and plan for potential uncertainties regarding water supply sources in the San Diego region, this 2025 UWMP incorporates a traditional scenario-based planning process. This process assesses potential risks associated with implementation of projected resource mixes and management strategies to help address potential uncertainty. The Water Authority's water supply reliability assessment, under normal and dry weather conditions, is detailed in Chapter 9*, Water Supply Reliability*, of this 2025 UWMP. Procedures to track development of future member agency water supply sources to determine when and if potential adaptive management strategies may be needed are also discussed in this chapter. For this UWMP, the Water Authority used a traditional scenario planning approach from *Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning* (WUCA, 2010).

10.2 Traditional Scenario Planning Process

Various decision support planning methods are available to planners that incorporate uncertainty and risk assessment in water planning. Traditional scenario planning was selected for this 2025 UWMP based on the following characteristics:

- Used for uncertainty analysis specific to water resources and 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 improving understanding and communicability and helping develop flexible strategies

Key steps of the 2025 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
2. Identify projected water resource supply mix
3. Identify critical uncertainties that could influence implementation and management of the water resource supply mix
4. Formulate potential scenarios based on critical uncertainties

5. Identify strategies to manage exchange initiatives and portfolio flexibility
6. Establish key tracking metrics that evaluate the status of water 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 following question was developed by the Water Authority to define the focal issue to be addressed through the scenario planning process:

In a climate of declining demand growth and imported supply uncertainty, what are the Water Authority's and member agencies' water supply management strategies to ensure continued reliability in dry, high-demand years and operational flexibility in wet, low-demand years?

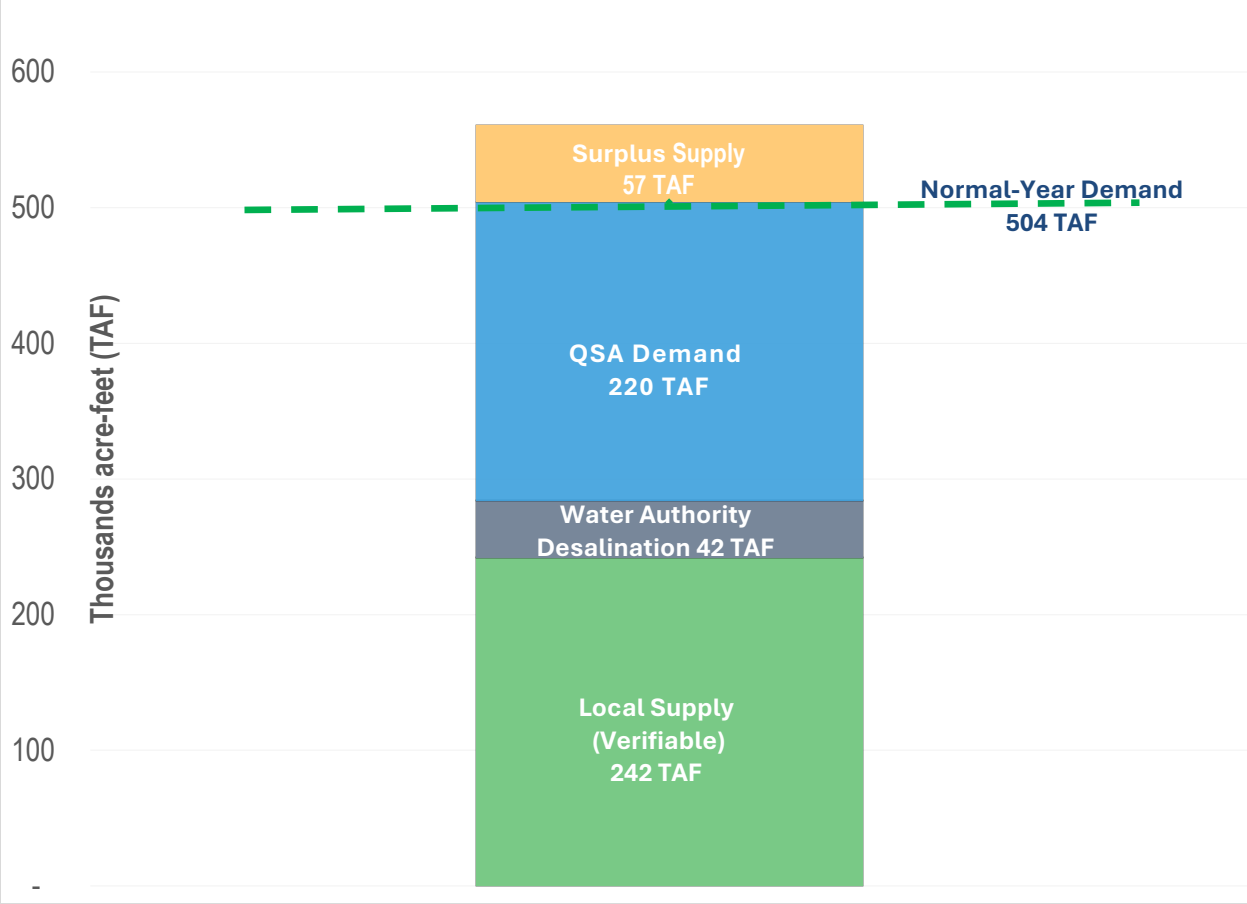
10.2.2 Identify Projected Resource Mix

As discussed in Chapter 9*, Water Supply Reliability*, a projected resource mix to meet future demands was generated in five-year increments in coordination with member agencies. For the scenario planning process, the 2045 projected resource mix was selected to evaluate long-term supply planning efforts in the San Diego region. The normal year resource mix in 2045 is based on the following:

- 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 Carlsbad Desalination Plant in accordance with the Water Purchase Agreement
- Out-of-region exchanges with Western and Eastern Municipal Water Districts

Figure 10-1 shows the projected resource mix for 2045 under normal weather conditions. Water demand in the scenarios below is net of projected member agency long-term water use efficiency savings. Additionally, out-of-region exchange demands of 20,000 AF, as discussed in Section 2.3, *Out-Of-Region Exchanged*, are incorporated into the demand forecast.

Figure 10-1 2045 Normal Year with Verifiable Local Supply Projects



QSA = Quantification Settlement Agreement; TAF = thousands of acre-feet

As shown in Figure 10-1, if projected Water Authority and member agency supplies are maintained and developed as planned, no shortages are anticipated in the Water Authority service area in 2045 under normal water year conditions. Furthermore, additional water exchange agreements are anticipated to be in place by 2045, which would reduce the surplus supply shown in Figure 10-1. Section 10.2.5, *Strategies to Manage Exchange Initiatives and Portfolio Flexibility*, addresses strategies to manage surplus supply conditions.

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 and governance. Critical uncertainties are listed below based on information from source documents such as the *California Water Plan Update 2023* (DWR, 2023) and Water Authority inter-departmental workshop with subject matter experts. Table 10-1 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 addressed through the Water Authority's *Integrated Contingency Plan: Emergency Operations Plan* (Water Authority, 2021). These critical uncertainties form the basis for developing potential future

scenarios. To aid in the process of formulating potential scenarios, uncertainties were categorized as either gradual or 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
Climate Change Impacts from long-term changes in temperature and precipitation, including changes to • Snowpack • Hydrologic Patterns • Rainfall • Sea Level Rise	**Droughts** Severity, timing, and frequency
SWP Reliability Future of Delta Conveyance	**Changing Policies/Regulations/Laws/Social Attitudes** • Regulatory restrictions that further limit supply availability • Emerging contaminants • Endangered species • Plumbing Code changes
Implementation and Governance Uncertainties • Future beyond IID Transfer agreement • Additional federal water conservation requirements in the Colorado River Basin under post-2026 guidelines • Local supplies not developed as planned	**Delta Levee Breach** Delta levees fail due to earthquake or flooding, and supplies from SWP are curtailed

10.2.4 Scenario Analysis: Future Potential Scenarios Based on Critical Uncertainties

The aforementioned report, *Decision Support Planning Methods: Incorporating Climate Change Uncertainties into Water Planning*, outlined the methodology for traditional scenario planning 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 developed four potential scenarios based on supply uncertainties and are described below.

Table 10-2 Future Potential Scenarios Identified for Planning Purposes

Future Potential Scenarios Identified for Planning Purposes	
1	Drought with Local Supply Projects Implemented as Planned
2	Drought with Local Supply Projects Delayed
3	Drought Post IID Transfer Agreement Expiration
4	Climate Change

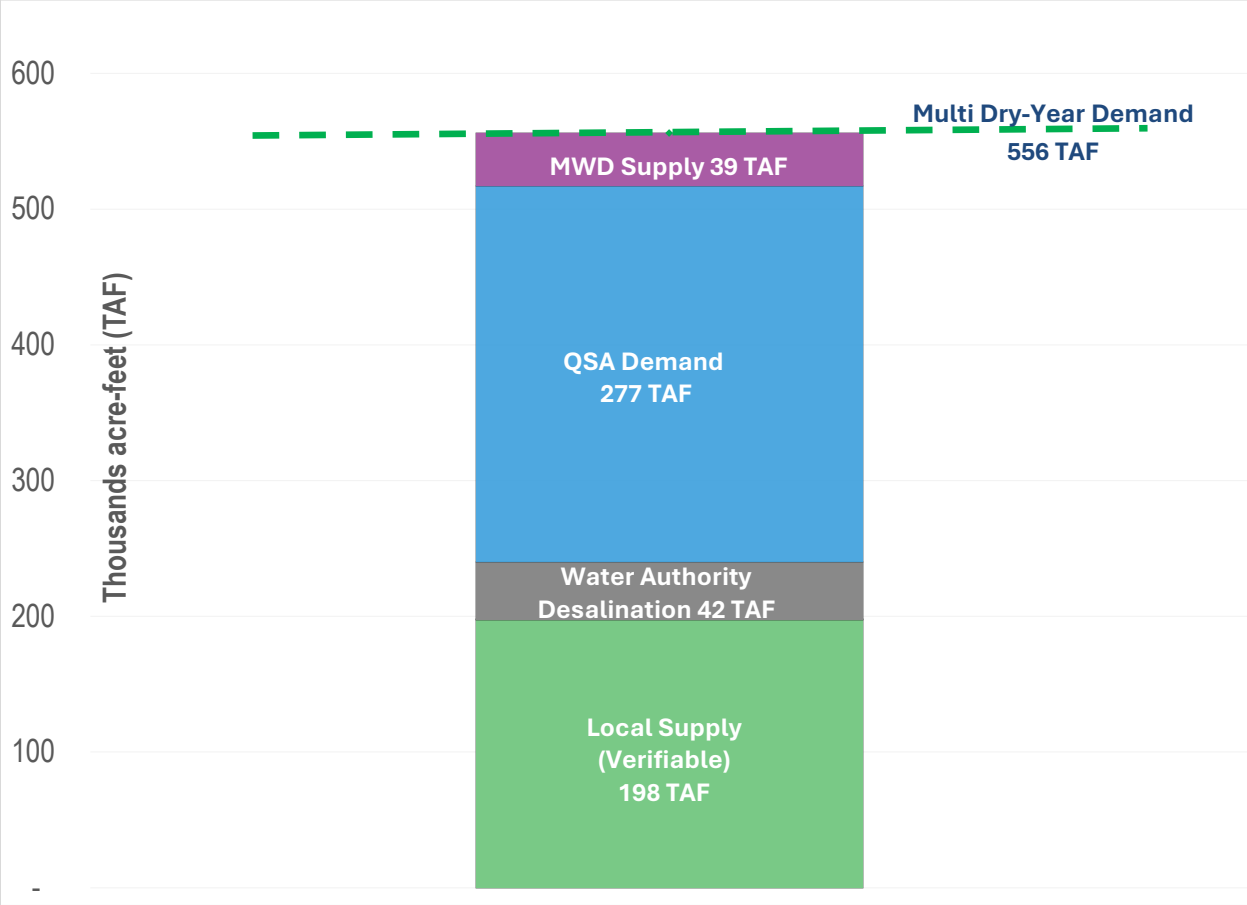
Scenario 1: Drought with Local Supply Projects Implemented as Planned

Scenario 1 assumes a multiple-year drought that results in maximum impact on demand. It was developed based on the following:

- Multi-dry year demand derived using CWA-MAIN modeling, an econometric forecasting model that applies statistical methods to economic data (see Chapter 2, *Water Demands*).
- Metropolitan allocating supplies. Water Authority allocation is based on preferential right to purchase supplies from Metropolitan. For the scenario analysis, Metropolitan available supply is assumed to be approximately one MAF (see Chapter 6*, Metropolitan Water District of Southern California*).
- Surface and groundwater supply yields reduced based on 2045 multiple dry-year supplies.
- Verifiable member agency projected water recycling, brackish groundwater, potable reuse, seawater desalination, and San Luis Rey Water Transfer supplies are developed and available.
- Water Authority's QSA supplies are delivered in accordance with agreements.
- Water Authority deliveries from Carlsbad Desalination Plant are made in accordance with the WPA.
- Out-of-region agreements with Western MWD and Eastern MWD are met.

The projected mix of water supplies is shown in Figure 10-2.

Figure 10-2 Scenario 1: Drought (2045) with Local Supply Projects Implemented as Planned



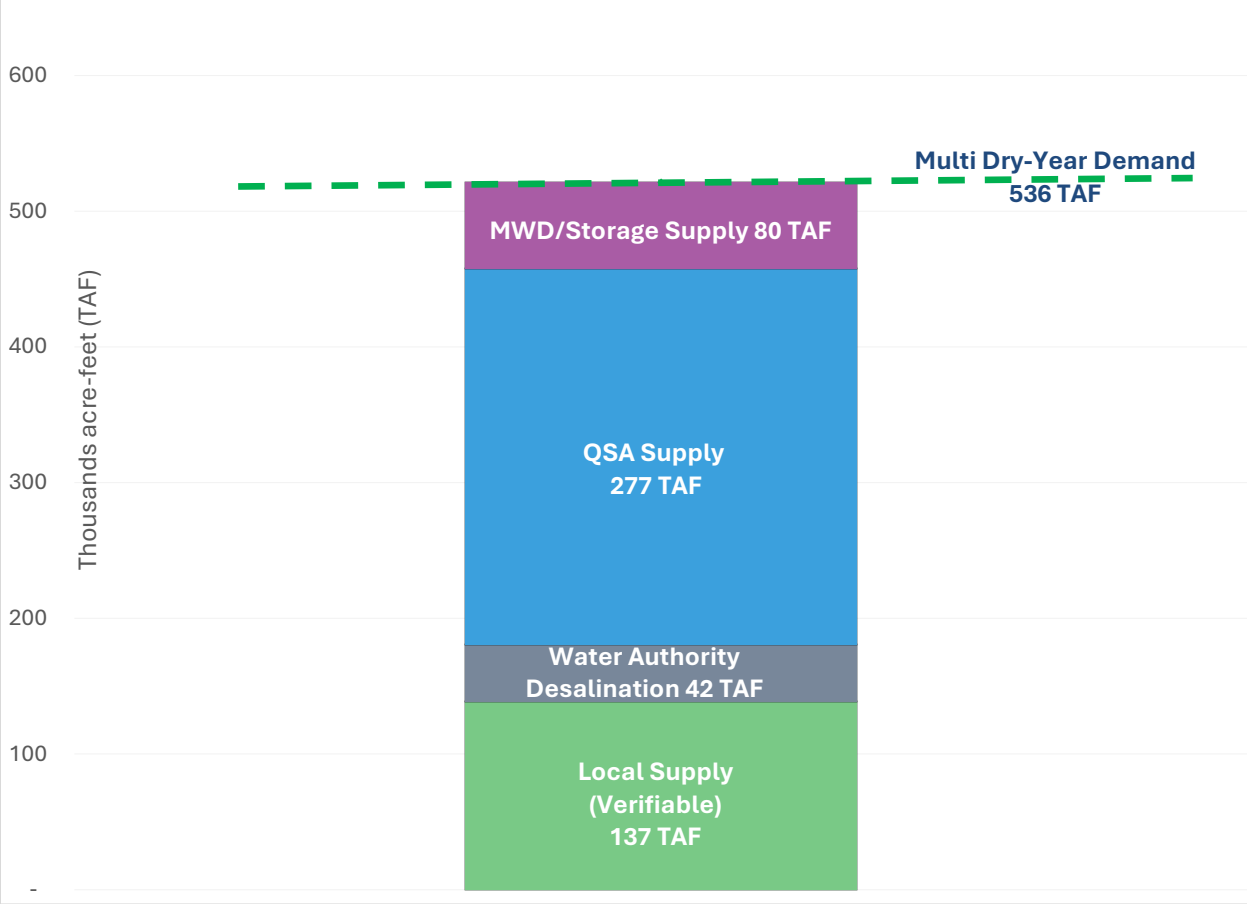
QSA = Quantification Settlement Agreement; TAF = thousands of acre-feet

Scenario 2: Drought with Local Water Supply Projects Delayed

Scenario 2 was developed using the same variables identified in Scenario 1, except verifiable potable reuse supplies are not developed as planned and remain at anticipated 2028 levels[1]. Additionally, the out-of-region exchanges are also assumed to be terminated. The projected mix of water supplies is shown in Figure 10-3.

[1] Assumes local potable reuse projects currently under construction are completed but all other potable reuse supply projects are delayed.

Figure 10-3 Scenario 2: Drought (2045) with Local Supply Projects Delay

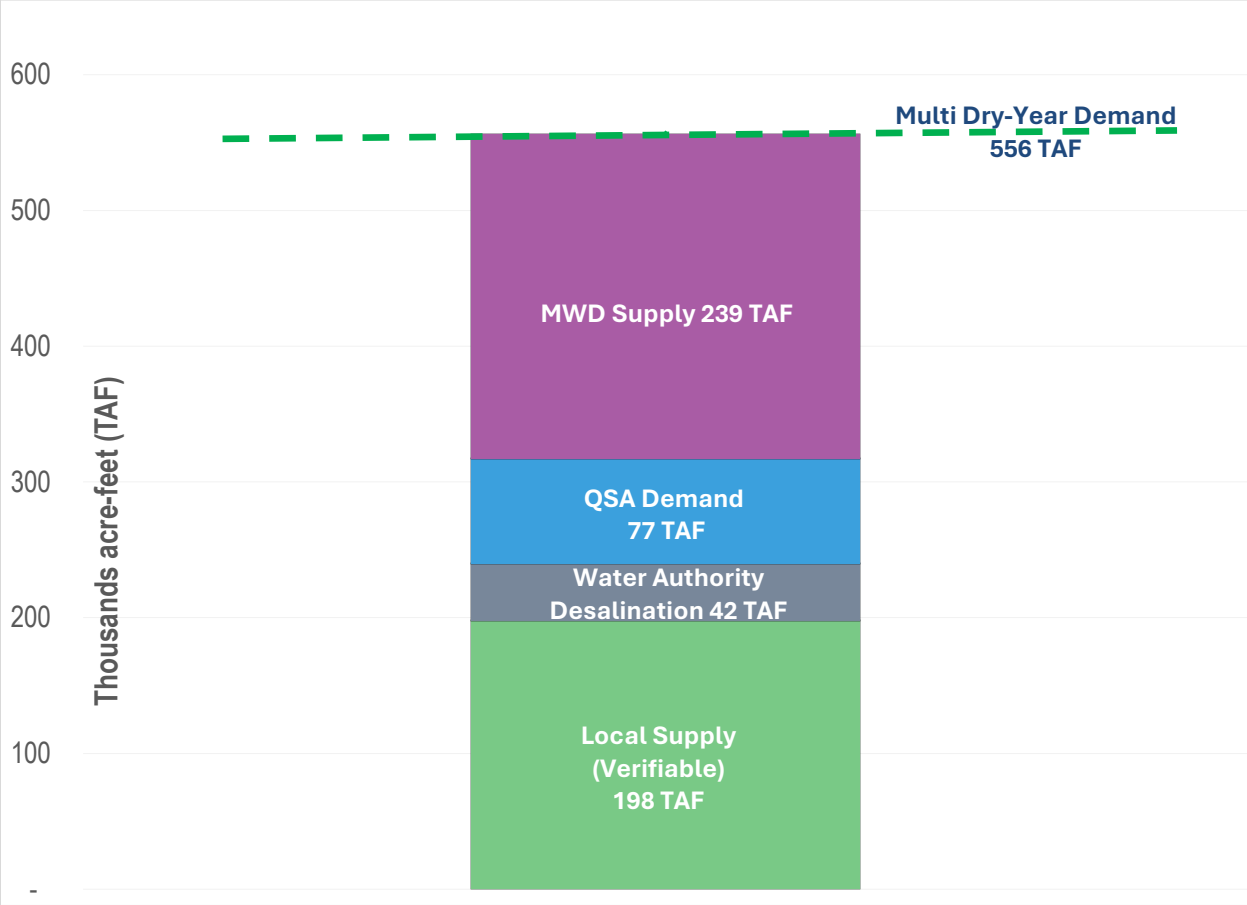


QSA = Quantification Settlement Agreement; TAF = thousands of acre-feet

Scenario 3: Drought Post IID Transfer Agreement Expiration

Scenario 3 was developed using the same variables identified in Scenario 1, except it assumes the IID transfer agreement and out-of-region exchanges, set to expire in 2047, are not extended. The projected mix of water supplies is shown in Figure 10-4. To estimate Metropolitan's supply to the Water Authority, preferential rights allocation methodology was considered. In 2045, the Water Authority preferential right is estimated to be approximately 28.61% (refer to Section 6.1.1*, Metropolitan Water District Act Section 135 – Preferential Right to Water*) with Metropolitan assumed to have access to 1.0 million AF of water supply under multi-year dry conditions. Potential imported water needs could be supplemented by Water Authority storage water if available.

Figure 10-4 Scenario 3: Drought (2045) Post IID Transfer Agreement Expiration



QSA = Quantification Settlement Agreement; TAF = thousands of acre-feet

Scenario 4: Climate Change

Scenario 4 considers the potential influence climate change may have on the projected resource mix. Since there are many uncertainties regarding the impact of climate change on water supply and demand, a qualitative risk assessment was conducted. The Water Authority shifted from quantitative bar graphs to a qualitative assessment as the impacts on water resources are driven largely by uncertain hydrologic variability. As a result, a bar chart similar to those used for the previous scenarios was not developed for Scenario 4. 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 is made between climate and weather. Weather consists of short-term (i.e., minutes to months) changes in the atmosphere and 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 with the ability to adapt planning strategies to manage for water supply uncertainties. The effect on water 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 air temperatures to rise on Earth. While uncertainties remain regarding exact timing, magnitude, and regional impacts of 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 as more precipitation falls as rain, and snowmelt occurs sooner. Snowpack in the Sierra Nevada is the primary source of supply for the SWP. Snowpack is often considered a large surface reservoir, where water is slowly released between April and July each year. Much of the water infrastructure in the state was designed to capture this slow spring runoff and deliver during drier summer and fall months. However, by the end of this century, DWR projects the Sierra Nevada snowpack could experience a 48-65% loss from its historical April 1 average.

Sea-Level Rise

Rising sea levels could increase the risk of damage to water infrastructure and water recycling facilities from storms, high tide events, and erosion of levees. A potential catastrophic levee breach in the Delta could interrupt SWP supplies, potentially reducing supply deliveries to the San Diego region from Metropolitan. In addition, rising sea levels could cause saltwater intrusion in the Delta, degrading drinking water quality. More freshwater releases from upstream reservoirs would be required to repel seawater and maintain salinity levels for M&I and agricultural uses.

Groundwater modeling predicts that coastal water tables in Southern California will rise consistently and extend farther inland as sea level rise progresses (COPR et al., 2019). Regionally, in Marine Corps Base Camp Pendleton, concerns regarding seawater intrusion into the base groundwater wells are due to sea level rise (COPR et al., 2019). Similarly, the Sweetwater Authority is currently evaluating methods to minimize potential seawater intrusion in its existing wellfields and is collaborating with the U.S. Geological Survey (USGS).

Changes in Wet and Dry Periods

The effect of climate change on overall precipitation and runoff volumes is still unclear and highly uncertain. For example, several studies conclude that Colorado River flow may be reduced by climate change, but wide disparity exists on predicted volume of that change. Yield from local surface water resources could potentially be reduced if annual runoff volumes decrease due to a decline in precipitation, or if an increase occurs in evapotranspiration in reservoirs.

The last two decades in California underscore a strong propensity for wet and dry periods, with a string of multi-year droughts punctuated by several wet years. Scripps Institution of Oceanography (Scripps) downscaled global models indicate by the mid-21st century, California dry years may become drier and wet years occasionally becoming wetter. According to Scripps, these precipitation and drought extremes would exacerbate other climate problems confronting the state, both flood- and drought-related. Two key climate change signals in the hydroclimate of California have been identified: progressively less frequent precipitation, particularly in the fall and spring, and greater precipitation extremes. Although these signals together provide the same annual mean precipitation, the natural volatility of the San Diego region hydroclimate is exacerbated by increasing reliance on the largest storms of the year to make up annual total precipitation.

In California, the variability of the annual water supply is dictated by the presence or absence of a few large winter storms. In most cases, these wet storms are identified as long, narrow bands of water vapor known as atmospheric rivers (ARs). ARs are the source of the heaviest rains on the West Coast. ARs are both a hazard and a benefit, causing most floods on the West Coast but delivering most of the rain and snow vital for water supplies in the state. Like hurricanes, ARs become more damaging the stronger they are. Scientists at Scripps study these storms to improve forecasts, assess their potential for producing rain and snow, and advise water managers who operate critical state reservoirs and infrastructure.

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. According to Scripps, tree rings and other paleoclimate evidence show the Southwest is prone to megadroughts that can last for decades. Such droughts will likely increase as global temperatures warm and California precipitation becomes more variable. Under warmer temperatures, more moisture evaporates from plants and soil, leading to drier seasonal conditions even in years with historically average precipitation. Seasonal aridity could intensify, with soils drying earlier in spring and remaining dry well into fall and occasionally winter. Scripps' modeling indicates the annual volume of water stored in Shasta and Oroville reservoirs, the two largest in the state, could shrink by one-third by the end of the century. This reduced storage could limit water supplies and thus lower resilience to droughts.

Demand Levels

Climate change could also gradually affect the duration of water demands in the future. Warmer temperatures increase evapotranspiration rates and the growing season, which are likely to increase outdoor consumptive water use for landscaping. Conversely, due to the probability of greater winter precipitation extremes, the San Diego region may experience fluctuating demand levels more often. As is evident in recent years, demand was significantly reduced, primarily driven by a second consecutive year of above-average rainfall. Another extreme weather event was observed when precipitation began unseasonably early with Tropical Storm Hilary in late August 2023, which brought two inches of rain suppressing peak summertime demand and augmenting member agencies' local surface water supplies earlier than normal.

As part of the water demand forecasting effort for this 2025 UWMP, the long-term influence of climate change on water demands in the San Diego region was evaluated (refer to analysis results in *Chapter 2, Water Demands*). All five areas of concern discussed above focus on the potential effect climate change could have on future water supply management. The overall long-term effect may be a possible decrease in the availability of imported water supplies from Metropolitan and member agencies' local supplies, or conversely, a regional surplus water supplies due to lower demands causing a significant imbalance between supply and demand.

10.2.5 Strategies to Manage Exchange Initiatives and Portfolio Flexibility

The Water Authority focuses on practical exchange mechanisms and portfolio-flexibility tools deployed across the scenarios discussed above, including when the IID transfer agreement reaches term, to manage surplus water supplies while preserving dry-year reliability. This approach aligns with the scenario framework and tracking/reporting cadence described elsewhere in this chapter. The objectives are to manage surplus volumes without compromising reliability standards, right-size long-term contractual commitments to verified demands, reevaluate future

local water supply development strategies, and remain consistent with existing contracts and Water Authority Board policy direction.

The long-term exchange-delivery agreements with Western Municipal Water District and Eastern Municipal Water District are examples of a strategy to manage portfolio flexibility by providing a structured mechanism for managing surplus QSA supplies while safeguarding dry-year reliability. These agreements collectively redirect up to 20,000 AFY of Water Authority QSA supplies to partner agencies, creating a dependable demand for surplus volumes and generating predictable revenue streams that help offset the risk of local sales falling below contractual supply commitments. By enabling the Water Authority to balance supply and demand across a wider regional footprint, these agreements function as core components of a broader surplus management and reliability framework.

Implementation Toolkit

- **Short-term and multi-year exchanges:** Execute seasonal or long-term exchanges with qualified partners to balance near-term surpluses and support operational storage flexibility.
- **Wheeling/conveyance arrangements:** Utilize available conveyance when economically favorable to move Water Authority supplies to counterparties.
- **Banking and carryover optimization:** Prioritize storage (surface or groundwater, where accessible) when forward risk or price signals favor carrying water into future periods.
- **Contract right-sizing—IID term option:** At the appropriate decision point, evaluate whether to allow the IID transfer agreement to expire (or extend potentially with a modified quantity) as a deliberate lever to align supplies with updated demand projections, backstopped by exchanges, desalination, local supplies, and storage, as identified in this chapter's scenarios.

Actions will be advanced when they meet the following criteria under dry and multi-dry year conditions:

- Demonstrate net present value and/or rate stabilization relative to alternatives.
- Are operationally feasible given conveyance and storage constraints.
- Remain consistent with existing contracts and the reporting framework shown in Table 10-3.

Table 10-3 Illustrative Exchange and Flexibility Actions

Action	Typical Use Case	Primary Benefit	Key Considerations (including Governance[1])
Short-term exchange	Seasonal or wet-year surplus conditions	Monetizes excess supply while preserving reliability	Counterparty performance. Delivery timing windows. Governance includes contracting authority and board approvals.
Multi-year exchange	Extended surplus or deficit periods	Smooths year-to-year variability and price volatility	Pricing and indexation. Drought protection. Governance includes approval thresholds and ongoing oversight.

Action	Typical Use Case	Primary Benefit	Key Considerations (including Governance[1])
Wheeling	Delivery of supply to third-party partners	Generates revenue and increases portfolio flexibility	System access and capacity limits. Governance includes participation requirements, wheeling/interagency agreements, board actions.
Banking/ carryover	Shifting wet-year supplies into dry years	Enhances reliability and drought resilience	Storage capacity and losses. Governance includes storage and recovery agreements, transfer rights, reporting.
ID term option	Sustained long-term surplus outlook	Aligns supply with demand and manages rate impacts	Backstop alternatives (reuse, desalination, storage). Governance includes long-term contract provisions.

IID = Imperial Irrigation District

[1] "Governance" refers to enabling policies/ordinances or legislation, required interagency agreements, board actions, and compliance with participation/allocation/reporting frameworks needed to implement the action.

Governance, Triggers, and Reporting

The Water Authority will implement regular assessments and updates to compare demand trends, storage levels, market conditions, and conveyance availability. Material exchange actions or changes in long-term contract position are brought to the Water Authority Board as warranted. Outcomes (e.g., volumes exchanged/banked, avoided purchases, and reliability metrics) are summarized through the Annual Water Supply and Demand Assessment (AWSDA) and UWMP update cadence.

10.2.6 Key Tracking Metrics: Track Progress on Management of Projected Resource Mix and Need for Adaptive Strategies

Through this scenario planning analysis, a projected resource mix and four uncertainty scenarios were identified. Potential strategies to manage the resource mix were also identified. The final step establishes key tracking metrics to evaluate the status of supply sources in the projected resource mix and determines whether adaptive management strategies are required to ensure continued reliability.

As shown in Table 10-4, a full 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 AWSDA. The Water Authority process to prepare the AWSDA is described in Section 11.3.2, *Annual Water Supply and Demand Assessment*. Reporting to the Water Authority Board on issues related to management of the resource mix may 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 Water Authority Board	Update the Water Authority Board on issues impacting resource mix implementation

10.2.7 Conclusion

The scenarios evaluated utilizing the scenario planning process described in this chapter demonstrate that the San Diego region is well positioned to maintain a safe, reliable water supply across the planning horizon—even under extreme conditions. This conclusion reflects decades of work to assemble a diversified, drought-resilient portfolio that includes member-agency verifiable projects and long-term efficiency, QSA supplies, desalination, and Metropolitan supplies. This chapter also identified executable exchange concepts and portfolio-flexibility measures that encourage partnerships, support prudent storage or monetization of surplus volumes and mutually beneficial transfers. Regular tracking through the annual assessment and five-year UWMP updates ensures that the water supply portfolio in the San Diego region can be adjusted as conditions evolve, safeguarding reliability and affordability for customers and communities served.

10.3 References

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Chapter 11: Water Shortage and Drought Planning

11.1 Introduction

This chapter 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 WSCP, which is presented in Appendix E, *Water Shortage Contingency Plan*, and identifies actions to be taken in response to various water shortage levels, as well as 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 San Diego region's needs or eliminates access to imported water supplies. This section describes the Water Authority's Integrated Contingency Plan (ICP) and ESP, 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 2023 *Multi-Jurisdictional Hazard Mitigation Plan for San Diego County,* included as Appendix D to the Water Authority's WSCP, provided as Appendix E to this UWMP.

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 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 Incident Command System (ICS) 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
- ICS 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 ICS 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* (County of San Diego and USDCESO 2022), which in turn supports the Water Authority's ICP.

11.2.2 Emergency Storage Project

The Water Authority's 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 San Diego 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 San Diego 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 member agency demand, or any portion thereof. The Board may 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 total storage capacity)
- San Vicente Reservoir (52,100 AF total storage capacity)

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 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.

The ESP storage and conveyance facilities include the following:

- Olivenhain Reservoir
- Olivenhain Pipeline and Pump Station
- San Vicente Reservoir Dam
- 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 will provide treated water to all member agency customers during an emergency event. Final ESP components to be built include ESP pump stations and associated conveyance facilities 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. The estimated completion date for the Valley Center MWD and Yuima MWD ESP facilities is late 2026.

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 considering other supplies available to its member agencies. The level of service is the ratio of all water 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 Reservoir. 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 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, the 2015 completion of the Carlsbad Desalination Plant 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 Twin Oaks Valley WTP, especially during a two-month emergency event.

The following general procedures from the *Emergency Water Delivery Plans* (Water Authority, 2013) show the methodology for calculating allocation of ESP supplies to member agencies during a prolonged outage without access to imported supplies:

1. Define 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 total demand of each member agency during the emergency, considering both M&I and agricultural demands.
3. Determine net demand of each member agency, considering the availability of recycled water supplies.
4. Determine local supplies available to each member agency from groundwater and surface water storage.
5. Determine amount of local water that could be transferred within City of San Diego service areas, and between member agencies.
6. Determine amount of Carlsbad Desalination Plant supplies that could be delivered to member agencies.
7. Determine amount of imported water supplies from Metropolitan available to deliver to member agencies.
8. Allocate ESP supplies in Olivenhain 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 considering 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 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, process to prepare an annual water supply and demand assessment, drought response matrix and response level triggers, supply allocation methodology, and model drought response ordinance. The complete WSCP is provided in Appendix E, *Water Shortage Contingency Plan*.

11.3.1 Background

In 2006, the Board approved the Water Authority's Drought Management Plan (DMP), which 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, and to equitably allocate water supplies to member agencies (Water Authority, 2006). It also included an allocation methodology to equitably allocate water supplies to member agencies. The DMP was activated in 2007 in response to Metropolitan 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 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. The Board also adopted Resolution 2008-11 establishing procedures to administer supply allocation methodology contained in the DMP.

Using lessons learned 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 2017, to ensure 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). The revisions were consistent with the long-term framework contained in Executive Order B-37-16 (DWR, 2017), which directed state agencies to permanently shift California from emergency drought rules to long-term, ongoing water conservation, launching the framework that later became the "Making Conservation

a California Way of Life" legislation in 2018 through the passage of SB 606 and AB 1668. Because the Water Authority's WSCP was prepared in anticipation of the requirements that were added to the Water Code in 2018, only non-substantive updates to the WSCP were needed in the 2020 UWMP to meet UWMP Act requirements.

In response to a multi-year drought, Governor Newsom signed a series of executive orders between 2021 and 2023. In 2021, Executive Order N-10-2 called on all Californians to voluntarily reduce their water use by 15% from 2020 levels. To support this directive, the Water Authority activated Level 1 of the WSCP in October 2021. As drought conditions persisted, the Governor issued Executive Order N-7-22 in March 2022, which strengthened drought response measures including potential triggers for Level 2 actions and restrictions on irrigation of non-functional turf. In early 2023, Executive Order N-3-23 emphasized long-term water resilience and allowed for modification of prior drought mandates.

The first few months of 2023 brought a series of atmospheric rivers and a historically wet winter throughout California and the west improving water conditions significantly. On March 24, 2023, the Governor rescinded the emergency drought provisions, and the Water Authority formally deactivated its WSCP in June 2023. Due to the advanced planning efforts of the Water Authority and its member agencies, a smooth transition occurred between changes in water allocations during the first two activations of the drought planning document, and an avoidance of water allocations during the third occasion. Those planning efforts also resulted in a framework supporting regional consistency in public drought messaging. Additional background information can be found in Sections 2 and 3 of the WSCP.

11.3.2 Annual Water Supply and Demand Assessment

This section provides an overview of the process for annual assessments conducted to evaluate the Water Authority's M&I supplies and projected water demands. The annual 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, *Drought Response Matrix and Response Level Triggers*. A detailed description of the assessment is included in Section 4.1 of the WSCP.

Annual Water Supply and Demand Assessment Steps

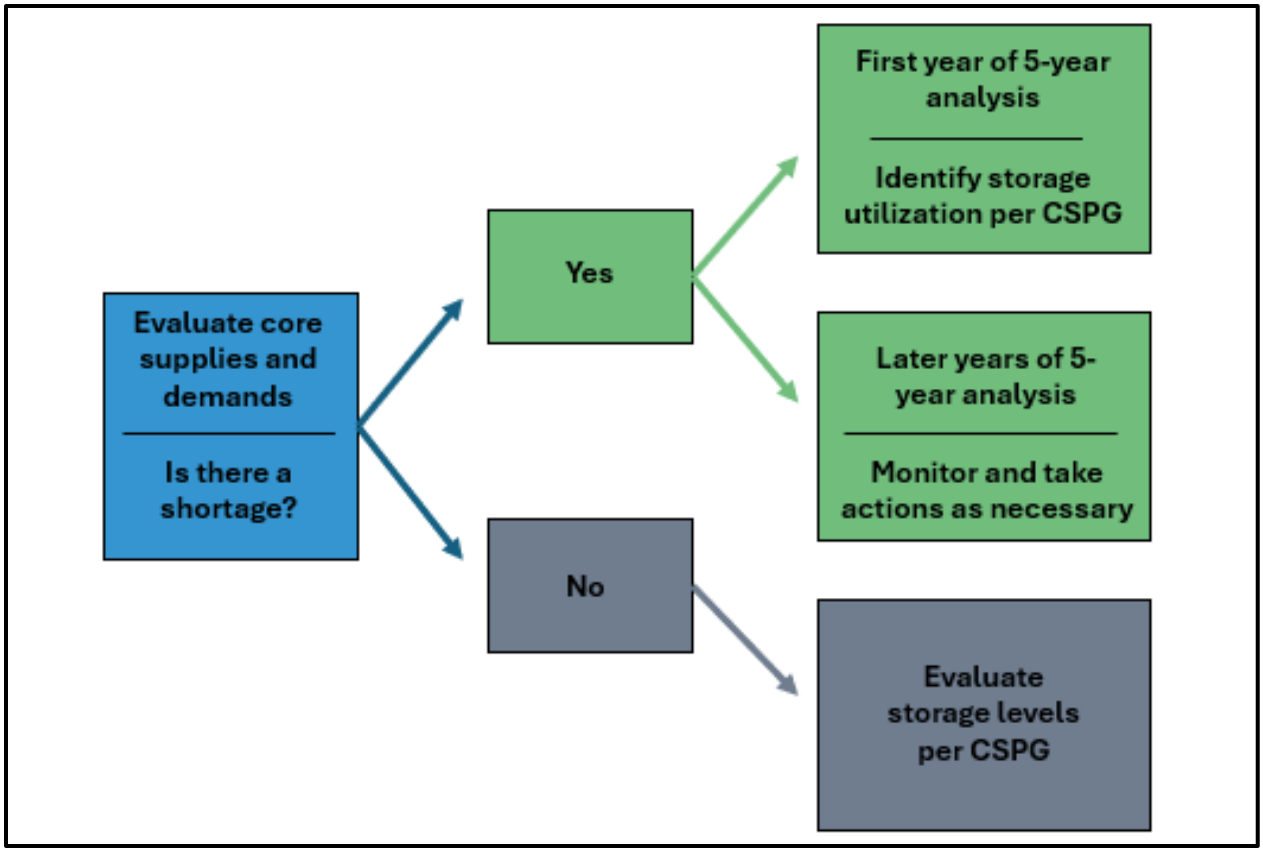
1. Water Authority core water supply sources are considered as part of the annual assessment including water supplies from the Claude "Bud" Lewis Carlsbad Desalination Plant, the 2003 QSA (Colorado River water), and Metropolitan. Evaluation of core water supplies includes an assessment of the infrastructure's capabilities and constraints that affect delivery. Information on these supplies is included in Chapter 4, *Water Authority Supplies*.
2. Member agency projected water demands on the Water Authority are considered. 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 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.

a. If a water supply shortfall is identified, the Water Authority evaluates the use of stored water reserves from carryover storage reserves or to pursue additional supply augmentation measures, such as dry-year transfers, to reduce or eliminate the shortfall.
b. If a water supply shortfall 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 Drought Response Matrix and Response Level Triggers

In periods of water supply shortages, the Water Authority will take actions towards reducing and eliminating a shortage. The Drought Response Matrix shown as Table 11-1 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 SB 606 requirements.

Table 11-1 Drought Response Matrix

	Water Authority M&I Drought Response Potential Actions[1]							
Regional Water Shortage Levels[2, 3]	Ongoing Water-Use Efficiency	Communication Plan	Supply Augmentation			Demand Reduction Measures		Member Agency M&I Supply Allocation
			Storage Withdrawals		Spot Transfers, Other	Additional	Extraordinary	
			CSP	ESP[4]				
Normal Conditions	✓							
Level 1 Up to 10%	✓	✓	✓					
Level 2 Up to 20%	✓	✓	✓		✓	✓		✓
Level 3 Up to 30%	✓	✓	✓	✓	✓	✓		✓
Level 4 Up to 40%	✓	✓	✓	✓	✓	✓	✓	✓
Level 5 Up to 50%	✓	✓	✓	✓	✓	✓	✓	✓
Level 6 Above 50%	✓	✓	✓	✓	✓	✓	✓	✓

[1] The matrix contains potential Water Authority regional actions. Member agencies can implement local jurisdiction regulations as necessary for their service areas. Actions listed in this table are not in sequential order and can be implemented at any point during a water supply shortage at the discretion of the Water Authority Board of Directors (Board).

[2] Water supply conditions throughout California may differ from conditions and available supplies in San Diego County. Drought response actions and mandates at the state level will be taken into consideration, however, regional water shortage levels and corresponding response actions will be determined based on local conditions.

[3] The response to a catastrophic emergency could occur under any response level. Potential Water Authority water supply shortage response actions include activation of the Integrated Contingency Plan and allocation of Emergency Storage Program supplies.

[4] The use of water storage supplies from the ESP to mitigate severe water supply shortages requires Board approval.

Regional water shortage levels identified on the Drought Response Matrix are defined as "up to" or "above" a specified percentage to provide more flexibility for member agencies to establish the appropriate local reduction level should their reduction not equate exactly to the regional number. Regional percent reduction may differ slightly from a member agency's percent reduction depending on the amount of local supplies available to that member agency.

To determine the specific actions to be taken at each level, the Water Authority and its member agencies evaluate conditions specific to 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.

The Board may not implement each of the identified actions in a response level but may select only those that are appropriate to the existing supply conditions. 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 member agencies to develop recommended regional actions for consideration by the Board.

Response level triggers vary depending on the severity of drought conditions and level of water supply shortage. For Level 1, 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 Levels 2-6, potential scenarios that could trigger a response are inadequate Water Authority core water supplies to meet member agency demands and water supply augmentation does not fully mitigate a core water 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. WSCP Section 5 in Appendix E contains information on regional water supply shortage response actions, levels, and triggers.

Table 11-2 Potential Response Level Triggers

Regional Water Shortage Response – M&I Demand Reduction Level	Scenarios
Level 1 – Up to 10%	• Potential core supply shortage in the near-term • Shortage in core supplies, but mitigated through carryover storage reserves • Implement communication plan to encourage conservation actions
Level 2 – Up to 20%	• Water Authority core supplies are not adequate to meet member agency demands • Supply augmentation (i.e. carryover storage reserves and/or dry-year transfers)

Regional Water Shortage Response – M&I Demand Reduction Level	Scenarios
	• Additional demand reduction measures are needed to reduce demands below the level of available supplies (i.e. guidelines on irrigation schedules or restrictions on outdoor washing activities) • Implement M&I supply allocations
Level 3 – Up to 30%	• ESP storage reserves may be utilized at the Board's discretion when the regional level of service drops below 75%
Level 4- Up to 40%	• Extraordinary demand reduction measures are needed to reduce member agency demands below the level of available supplies (i.e. banning the use of potable water for landscape irrigation or vehicle washing)
Level 5 – Up to 50%	
Level 6 – Above 50%	
Catastrophic Emergency	• 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 Supply Allocation Methodology

In the event of mandatory water supply cutbacks from Metropolitan, the WSCP includes an M&I allocation methodology to determine how the Water Authority's available water supplies will be equitably allocated to its member agencies. 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. The M&I allocation methodology applies to those member agency 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 provided in monthly progress reports to the Board and member agencies in a monthly staff report identifying how agency deliveries are tracking compared to their allocation target. The complete allocation methodology and resolution are located in the documentation of Water Authority supplies provided in Appendix D and in the WSCP provided as Appendix E to this 2025 UWMP.

To allocate deliveries under the PSAWR Program, a separate process is used where the water supply allocations are based on Metropolitan's cutback level to the Water Authority and Water Authority regional water supplies are not available to mitigate the cutback. Under this process, PSAWR Program demands are met through water supplies allocated from Metropolitan and are not supplemented with the Water Authority's regional water supplies from Colorado River transfers, 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 2025 UWMP development, is used to provide regional consistency during periods of water supply shortages. Six drought response levels are identified outlining water-use restrictions to help achieve demand reductions during temporary water supply shortages. The restrictions become more stringent at each successive level to reach 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 water supply shortage levels.

Table 11-3 Correlation between Model Drought Ordinance Response/WSCP Water Supply Shortage Levels

Drought Ordinance Response/WSCP Water Supply Shortage Levels	Conservation Target
1	Up to 10%
2	Up to 20%
3	Up to 30%
4	Up to 40%
5	Up to 50%
6	Above 50%

11.4 Dry Water Year Supplies and Carryover Storage

The Water Authority's dry water year supplies and carryover storage are important components of managing potential water supply shortages within the San Diego region and for increasing water supply reliability. The dry water year supplies help to minimize or reduce potential water supply shortages from Metropolitan. The Water Authority has developed the ESP and CSP to more effectively manage water supplies, which includes in-region surface water storage at San Vicente Reservoir. 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 San Diego region in the case of a water supply shortage, such as during a drought. The Water Authority has identified three main needs for carryover storage:

- Enhance water supply reliability: 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 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 existing SWP- and Colorado River-derived water sources during periods of greater availability, such as during wet years, to increase water availability locally during periods of water shortage, such as during dry years.

11.4.2 San Vicente Dam Raise Carryover Storage Project

The Water Authority's *Water Facilities Master Plan* identified a need for approximately 100,000 AF of carryover storage to assist in maintaining a secure and reliable water supply for the San Diego region (Water Authority, 2002). To meet this need, carryover storage was incorporated into the San Vicente Dam Raise project, which was originally pursued as a key element of the Water Authority's ESP and facilitates the reliable and efficient delivery of water to residents in the Water Authority service area. The project 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 San Diego region. Construction was completed in 2014.

Since the original Carryover Storage Policy Guidelines were established in 2016, regional demands have declined due to conservation, water use efficiency and additional local water supplies. The *2024 Water Facilities Master Plan* recommended reducing the carryover storage target to better align with current and projected demands, while creating more operational storage and flexibility. In April 2025, the Board approved an update to the CSP Guidelines (CSPG), setting a target of 40,000 AF total carryover storage, with flexibility to adjust based on supply and demand conditions.

11.4.3 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 water supply shortages, is influenced by multiple factors and should generally be handled on a case-by-case basis. Many of the factors that influence the storage take will vary depending upon conditions present. These factors include:

- Current member agency water demand trends
- Core water supply availability from imported and local sources
- Existing and projected hydrologic conditions
- Storage supply available for withdrawal
- Need to avoid depletion of storage reserves

For planning purposes in this 2025 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 water supply shortages. Carryover storage takes shown in the dry-year assessments presented in Chapter 9, *Water Supply Reliability*, are used for planning purposes only and do not dictate future carryover storage takes. The water 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 portion of the Water Authority's storage charge associated with carryover storage levels and in turn receive no water from the CSP or ESP. In September 2020, the Board adopted an ordinance that established the PSAWR Program beginning in January 2021. In June 2025, the Board adopted an ordinance that established a PSAWR supply rate that allocates a proportionate percentage of the operation storage charge to PSAWR Program customers, while still exempt from the portion of the Water Authority's storage charge associated with carryover and emergency storage levels.

11.4.4 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 SWP 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 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 ability of the Water Authority and member agencies to manage drought with the current available water supplies. In addition, securing dry water 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 reduction mandates.

11.5 Penalties for Excessive Water Use

Penalty rates may be used by the Water Authority to encourage conservation and reduce member agency 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 passthrough to the Water Authority's member agencies of any penalties levied by Metropolitan on the Water Authority for exceeding its annual allocation. The Water Authority is subject to significant financial penalties if it exceeds its Metropolitan allocation. Penalties are assessed at the end of the fiscal year, on a pro rata basis to member agencies that exceed their allocations.

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 allocated 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 1990, the Water Authority created a rate stabilization fund (RSF) to mitigate the need for rate increases in the event of an unexpected decline in water sales. In 2006 and 2018, the Board adopted refinements to the RSF to ensure appropriate reserve levels during periods of reduced demand due to rainfall. As part of the 2026 Long-Range Financing Plan, the RSF policy has been updated to replace the prior wet-weather methodology with a two-component structure that better aligns reserve levels with current financial risks and rating-agency expectations. Under the updated policy, the RSF now consists of (1) a debt-coverage protection component based on senior lien debt service, and (2) a proactive rate-relief component that allows for Board-directed rate smoothing and mitigation. This clarified structure increases transparency while maintaining Board discretion to mitigate revenue and rate volatility.

In 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 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 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 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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2025 UWMP Appendix A

California Water Code Changes

Changes to the California Water Code Since 2020 Urban Water Management Planning

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

This appendix presents changes made to the California Water Code (Water Code) statutes that appeared in the 2020 Urban Water Management Plan Guidebook (2020 Guidebook), and includes updated Water Code statutes as of the publication of this Guidebook. The information presented here focuses on Water Code sections affecting urban water suppliers (Suppliers) and the California Department of Water Resources (DWR), as compiled by DWR staff.

Further legislative information is available on the California Legislative Information website.

The Water Code sections listed below are presented on the following pages:

Division 1, General State Powers over Water

- Chapter 1, General State Policy

Division 6, Conservation, Development, and Utilization of State Water Resources

- Part 2.55, Sustainable Water Use and Demand Reduction
  - Chapter 2, Definitions
  - Chapter 2.5, Nonfunctional Turf
  - Chapter 9, Urban Water Use Objectives and Water Use Reporting

Note: ~~strikeouts~~ indicate text removed since the 2020 Guidebook while underlined text represents new language since 2020.

Division 1, General State Powers over Water

Chapter 1, General State Policy

Section 110 is added to the Water Code, to read:

Section 110.

(a) The Legislature hereby finds and declares all of the following:

(1) The use of potable water to irrigate nonfunctional turf is wasteful and incompatible with state policy relating to climate change, water conservation, and reduced reliance on the Sacramento-San Joaquin Delta ecosystem.

(2) The Governor reported in August 2022 that climate change will bring significant enduring reductions in California's water supply and that the state must take steps to respond to this reality.

(3) The State of Nevada enacted AB 356 in 2021 to prohibit the use of Colorado River water to irrigate nonfunctional turf on all properties except single-family residences by January 1, 2027.

(b) It is the intent of the Legislature that the irrigation of grasses for agricultural production shall not be limited by requirements to eliminate the use of potable water to irrigate nonfunctional turf.

(c) The Legislature hereby directs all appropriate state agencies to encourage and support the elimination of irrigation of nonfunctional turf with potable water.

Division 6, Conservation, Development, and Utilization of State Water Resources

Part 2.55, Sustainable Water Use and Demand Reduction

Chapter 2, Definitions

Section 10608.12.

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

(a) "Affordable housing" has the same meaning as defined in Section 34191.30 of the Health and Safety Code.

(b)~~(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.

(c)~~(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.

(d)~~(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.

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

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

(g) "Common area" means that portion of a common interest development or of a property owned or managed by a homeowners' association or a community service organization or similar entity that is not assigned or allocated to the exclusive use of the occupants of an individual dwelling unit within the property.

(h) "Common interest development" has the same meaning as in Section 4100 of the Civil Code.

(i) "Community service organization or similar entity" has the same meaning as in Section 4110 of the Civil Code.

(j) "Community space" means an area designated by a property owner or a governmental agency to accommodate human foot traffic for civic, ceremonial, or other community events or social gatherings.

(k)~~(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.

(l)~~(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.

(m) "Functional turf" means a ground cover surface of turf located in a recreational use area or community space. Turf enclosed by fencing or other barriers to permanently preclude human access for recreation or assembly is not functional turf.

(n)~~(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.

(o) "Homeowners' association" means an "association" as defined in Section 4080 of the Civil Code.

(p)~~(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.

(q)~~(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.

(r)~~(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.

(s)~~(l)~~ "Large landscape" means a nonresidential landscape as described in the performance measures for CII water use adopted pursuant to Section 10609.10.

(t)~~(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.

(u) "Nonfunctional turf" means any turf that is not functional turf, and includes turf located within street rights-of-way and parking lots.

(v)~~(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.

(w)~~(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.

(x) "Potable water" means water that is suitable for human consumption.

(y)~~(p)~~ "Process water" means water used by industrial water users for producing a product or product content or water used for research and development. Process water includes, but is not limited to, continuous manufacturing

processes, and water used for testing, cleaning, and maintaining equipment. Water used to cool machinery or buildings used in the manufacturing process or necessary to maintain product quality or chemical characteristics for product manufacturing or control rooms, data centers, laboratories, clean rooms, and other industrial facility units that are integral to the manufacturing or research and development process is process water. Water used in the manufacturing process that is necessary for complying with local, state, and federal health and safety laws, and is not incidental water, is process water. Process water does not mean incidental water uses.

(z) "Public water system" has the same meaning as defined in Section 116275 of the Health and Safety Code.

(aa) "Recreational use area" means an area designated by a property owner or a governmental agency to accommodate human foot traffic for recreation, including, but not limited to, sports fields, golf courses, playgrounds, picnic grounds, or pet exercise areas. This recreation may be either formal or informal.

(ab)~~(q)~~ "Recycled water" means recycled water, as defined in subdivision (n) of Section 13050.

(ac)~~(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.

(ad)~~(s)~~ "Reporting period" means the years for which an urban retail water supplier reports compliance with the urban water use targets.

(ae) "Turf" has the same meaning as defined in Section 491 of Title 23 of the California Code of Regulations.

(af)~~(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.

(ag) "Urban water supplier" has the same meaning as defined in Section 10617.

(ah)~~(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.

(ai)~~(v)~~ "Urban water use target" means the urban retail water supplier's targeted future daily per capita water use.

(aj)~~(w)~~ "Urban wholesale water supplier" means a water supplier, either publicly or privately owned, that provides more than 3,000 acre-feet of water annually at wholesale for potable municipal purposes.

Chapter 2.5, Nonfunctional Turf

Section 10608.14.

(a) The use of potable water for the irrigation of nonfunctional turf located on commercial, industrial, and institutional properties, other than a cemetery, and on properties of homeowners' associations, common interest developments, and community service organizations or similar entities is prohibited as of the following dates:

(1) All properties owned by the Department of General Services, beginning January 1, 2027.

(2) All properties owned by local governments, local or regional public agencies, and public water systems, except those specified in paragraph (5), beginning January 1, 2027.

(3) All other institutional properties and all commercial and industrial properties, beginning January 1, 2028.

(4) All common areas of properties of homeowners' associations, common interest developments, and community service organizations or similar entities, beginning January 1, 2029.

(5) All properties owned by local governments, local public agencies, and public water systems in a disadvantaged community, beginning January 1, 2031, or the date upon which a state funding source is made available to fund conversion of nonfunctional turf on these properties to climate-appropriate landscapes, whichever is later.

(b) Notwithstanding subdivision (a), the use of potable water is not prohibited by this section to the extent necessary to ensure the health of trees and other perennial nonturf plantings, or to the extent necessary to address an immediate health and safety need.

(c) The board may, upon a showing of good cause for reasons including economic hardship, critical business need, and potential impacts to human health or safety, postpone a compliance deadline in subdivision (a) by up

to three years for certain persons, institutions, and businesses, and may create a form to be used for compliance certification to the board by property owners.

(d) Public water systems shall, by no later than January 1, 2027, revise their regulations, ordinances, or policies governing water service to include the requirements of subdivisions (a) and (b), as revised by the board pursuant to subdivision (c), and shall communicate the requirements to their customers on or before that date.

(e)

(1) An owner of commercial, industrial, or institutional property with more than 5,000 square feet of irrigated area other than a cemetery shall certify to the board, commencing June 30, 2030, and every three years thereafter through 2039, that their property is in compliance with the requirements of this chapter.

(2) An owner of a property with more than 5,000 square feet of irrigated common area that is a homeowners' association, common interest development, or community service organization or similar entity shall certify to the board, commencing June 30, 2031, and every three years thereafter through 2040, that their property is in compliance with the requirements of this chapter.

(f) Noncompliance by a person or entity with this chapter or regulations adopted thereunder shall be subject to civil liability and penalties set forth in Section 1846, or to civil liability and penalties imposed by an urban retail water supplier pursuant to a locally adopted ordinance or policy.

(g)

(1) A public water system, city, county, or city and county may enforce the provisions of this chapter.

(2) To avoid duplication of enforcement, any entity identified in paragraph (1) that is not a retail public water system shall notify the retail public water system 30 days prior to enforcement of the provisions of this chapter against a property served by such system.

(3) Nothing in paragraph (2) shall preclude enforcement by any entity identified in paragraph (1) once adequate notice is given.

(h) The department shall, when using funds appropriated for water conservation for turf replacement, prioritize financial assistance for nonfunctional turf replacement to public water systems serving disadvantaged communities and to owners of affordable housing.

(i) The department shall utilize the saveourwater.com internet website and outreach campaign to provide information and resources on converting nonfunctional turf to native vegetation.

(j) The Governor's Office of Business and Economic Development shall support small and minority-owned businesses that provide services that advance compliance with this chapter.

Chapter 9, Urban Water Use Objectives and Water Use Reporting

Section 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~~47 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~~42 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.~~to assess and quantify the economic benefits and impacts of the 2030 indoor residential use standard on water, wastewater, and recycled water systems and shall include saturation end-use studies. The studies and investigations shall build on the standards and potential effects identified pursuant to subdivision (c) of Section 10609.2 and

shall also consider, and as appropriate incorporate, other regional and statewide studies that quantify the impacts on water, wastewater, and recycled water systems, and evaluate the long-term effects of telework. To facilitate these studies and investigations, the board may request necessary and relevant information from wastewater agencies, including monthly influent flow, actions taken to reassess treatment processes, and the impact of the implementation of this chapter on wastewater operations, maintenance, and capital investment. The department, in coordination with the board, shall summarize the findings of these studies and investigations in a report to the Legislature on or before October 1, 2028. The report shall be submitted in compliance with Section 9795 of the Government Code.

~~(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.~~

(2) If the department, in coordination with the board, determines that the 2030 indoor residential use standard is likely to unduly impact affordability of water and wastewater services, the department and the board may jointly recommend to the Legislature an alternate date on which the 2030 indoor residential use standard shall take effect. This determination shall be made using at least two years of data reflecting application of the 2025 indoor residential use standard.

(3) Based upon the studies and investigations conducted pursuant to paragraph (1), the department shall consider whether to recommend, for adoption by the board, additional variances to accommodate unique challenges related to residential indoor water use pursuant to Section 10609.2. Variance options may include, but are not limited to, stranded assets, impacts on disadvantaged communities, impacts to environmental flows, or adverse impacts to wastewater or recycled water operations.

(4) The studies, investigations, and report described in paragraph (1) shall include timely and inclusive collaboration with, and input from, a broad group of stakeholders, including, but not limited to, environmental groups, experts in indoor plumbing, water, wastewater, and recycled water agencies.

(c) An urban retail water supplier shall not be subject to enforcement pursuant to this chapter solely for failing to meet the indoor residential use standard.

2025 UWMP Appendix B

Water Authority 2025 UWMP Implementation Documents

TOP ISSUE

Water Authority Releases Water Planning Documents for Public Review and Comment

MARCH 12, 2026

The San Diego County Water Authority today released its draft 2025 Urban Water Management Plan (UWMP) and draft Water Shortage Contingency Plan (WSCP) for public review. The plans evaluate water supply reliability over a 25-year planning horizon and confirm that the region has sufficient water supplies through 2050, even during multiple dry years.

Public Review Period

The draft documents are available for a 45-day public comment period ending April 25, 2026. The Water Planning and Environmental Committee of the Water Authority's Board of Directors will hold a public hearing on April 23, 2026 to receive public comments on the draft plans.

About the Draft Plans

The draft UWMP confirms that the Water Authority's diversified portfolio of water supplies, combined with sustained water-use efficiency efforts, will meet the region's water supply needs through 2050. The long-range demand forecast included in the plan shows regional water demands are expected to remain nearly flat over the planning horizon.

As part of its long-term supply strategy, the Water Authority is pursuing transfer agreements that could exchange excess water with agencies outside of the San Diego region. These agreements could generate additional revenue to help mitigate future rate increases.

Next Steps

April 23, 2026 – Public hearing before the Water Planning and Environmental Committee

April 25, 2026 – End of the 45-day public comment period

May 28, 2026 – Board of Directors expected to consider adoption of the final plans

July 1, 2026 – Final plans due to the California Department of Water Resources

How to Review or Submit Comments

To review the draft plans, visit:

SDCWA Public Review Draft 2025 UWMP With Appendices

SDCWA Public Review Draft 2025 WSCP

The public comment period is now closed. The above linked documents are draft versions of the Urban Water Management Plan. The San Diego County Water Authority Board of Directors is scheduled to consider adoption of the plan on May 28, 2026. Please contact Efren Lopez, Senior Water Resources Specialist, for more information at **elopez@sdcwa.org**.

Background

Urban water suppliers in California are required to update Urban Water Management Plans every five years. The plans assess water supply reliability under normal, single dry-year and multiple dry-year conditions. The planning process includes analysis of demand forecasts, water supply sources, water-use efficiency programs and shortage contingency planning.

Together, these planning documents help guide long-term water supply planning and ensure that San Diego County maintains reliable water supplies for the region's 3.3 million residents and $267 billion economy.

BACK TO ALL NEWS

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2025 UWMP Appendix C

DWR 2025 UWMP Checklist

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and overview	n/a	Pg. 1-1
X	X	Chapter 1	10630.5	Each plan shall include a simple description of the Supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a Supplier may also choose to include a simple description at the beginning of each chapter.	Plan preparation	n/a	Pg. 1-1
X	X	Section 2.1	10620(b)	Every person that becomes a Supplier shall adopt UWMP within one year after it has become a Supplier.	Plan preparation	n/a	Pg. 1-1
X	n/a	Section 2.5	10644	Supplier shall report the Public Water Systems number, volume of delivered water, and number of connections that are included in this UWMP.	Plan preparation	2-1	n/a
X	X	Section 2.5	10644	Supplier shall report if this UWMP is an individual UWMP and whether the Supplier belongs to a regional UWMP or regional alliance.	Plan preparation	2-2	Pg. 1-5
X	X	Section 2.5	10644	Supplier shall report whether the data is in fiscal or calendar years and the units of measure used for reporting water volumes.	Plan preparation	2-3	Pg. 2-1
X	X	Section 2.4	10642	Provide supporting documentation that the Supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan preparation	n/a	Pg. 1-13
X	X	Section 2.4.2	10620(d)(3)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other Suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan preparation	n/a	Pg. 1-5
X	n/a	Section 2.4.1	10631(h)	Retail Suppliers will include documentation that they have provided their Wholesale Supplier(s)—if any—with water use projections from that source.	Plan preparation	2-4 R	n/a

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
n/a	X	Section 2.4.1	10631(h)	Wholesale Suppliers will provide their Suppliers with identification and quantification of the existing and planned sources of water available from the Wholesale Supplier to the Supplier during various water year types.	Plan preparation	2-4 W	n/a
X	X	Chapter 3.0	10631(a)	Describe the Supplier service area.	System description	n/a	Pg. 3-5
X	X	Section 3.3	10631(a)	Describe the climate of the Supplier's service area.	System description	n/a	Pg. 3-6
X	X	Section 3.4.1	10631(a)	Provide the current and projected service area populations for 2030, 2035, 2040, 2045 and optionally 2050.	System description	3-1	Pg. 3-9
X	X	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the Supplier's water management planning.	System description	n/a	Pg. 3-10
X	X	Section 3.5	10631(a)	Describe the land uses within the service area… include the current and projected land uses within the existing or anticipated service area affecting the Supplier's water management planning. Describe the land uses within the service area.	System description and baselines	n/a	Pg. 3-12
X	Optional	Sections 4.2.3 and 4.2.4	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System water use	4-1 and 4-2	Pg. 4-3
X	Optional	Section 4.3.1	10631(d)(3)(A)	Report the distribution system water loss for each of the five years preceding the plan update.	System water use	4-5	Pg. 4-9
X	n/a	Section 4.3.2	10631(d)(3)(C)	Retail Suppliers shall provide data to show the distribution loss standards were met.	System water use	4-6	n/a
X	n/a	Section 4.2.5.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the Supplier.	System water use	4-3	n/a
X	n/a	Section 4.2.5.3	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans, and other policies or laws.	System water use	4-3	n/a

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	n/a	Section 4.2.5.3	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System water use	4-3	n/a
X	n/a	Section 4.2.5.3	10631(d)(4)(B)(ii)	To the extent that a Supplier reports the information described in subparagraph (A), an urban water Supplier shall… 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.	System water use	4-3	n/a
X	X	Section 4.2.5.6	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System water use	n/a	Pg. 9-9
n/a	X	Section 5.1	10608.36	Wholesale Suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their Retail Suppliers achieve targeted water use reductions.	Baselines and targets	n/a	Pg. 5-18
X	n/a	Section 5.2	10608.4	"Retail Suppliers shall report on their compliance in meeting their water use targets. Reporting requirements will vary depending on whether the Supplier: - Was considered an urban retail water supplier in 2020, - Met its 2020 target in 2020, or - Was part of a merger or consolidation since 2020. Chapter 5 Subsections 5.2.1, 5.2.2, and 5.2.3 address each of these situations.	Baselines and targets	5-1	n/a
X	X	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System supplies	n/a	Pg. 6-1
X	X	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, including changes in supply due to climate change.	System supplies	n/a	Pg. 9-2

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 6.2.2	10631(b)(4)(C)	Indicate whether groundwater is an existing or planned source of water available to the Supplier. If groundwater is identified as an existing or planned source of water… (include) a detailed description and analysis of the location, amount and sufficiency of groundwater pumped by the Supplier for the past five years.	Water supplies and recycled water	6-1	Pg. 5-5
X	X	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the Supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System supplies	n/a	Pg. 5-11
X	X	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System supplies	n/a	Pg. 5-12
X	X	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the Supplier has the legal right to pump.	System supplies	n/a	Pg. 5-12
X	X	Section 6.2.2	10631(b)(4)(B)	For unadjudicated basins… (include) information as to whether DWR has identified the basin as a high- or medium-priority basin in the most current official departmental bulletin…	Water supplies and recycled water	n/a	Pg. 5-11
X	X	Section 6.2.2	10631(b)(4)(B)	For unadjudicated basins… describe efforts by the Supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	Water supplies and recycled water	n/a	Pg. 5-12
X	X	Section 6.2.2	10631(b)(4)(C)	If groundwater is identified as an existing or planned source of water… (include) a detailed description and analysis of the location, amount and sufficiency of groundwater pumped by the Supplier for the past five years.	System supplies	n/a	Pg. 5-12
X	X	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System supplies	6-9	Pg. 5-12

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 6.1	10631(b)	Identify and quantify the existing and planned sources of water available for 2025, 2030, 2035, 2040, 2045 and optionally 2050.	System supplies	6-8 and 6-9	Pg. 9-2
X	X	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System supplies	n/a	Pg. 2-3
X	n/a	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the Supplier's service area with quantified amount of collection and treatment and the disposal methods.	System supplies (recycled water)	6-2	n/a
X	X	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System supplies (recycled water)	6-3	Pg. 5-16
X	X	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the Supplier's service area.	System supplies (recycled water)	6-4	Pg. 5-13
X	X	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System supplies (recycled water)	6-4	Pg. 5-13
X	X	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the Supplier's service area at the end of 5, 10, 15, and 20 years, and describe the actual use of recycled water in comparison to uses previously projected.	System supplies (recycled water)	6-4 and 6-5	Pg. 5-21
X	X	Section 6.2.5	10633(f)	Describe the actions that may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System supplies (recycled water)	6-6	Pg. 5-18
X	X	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the Supplier's service area.	System supplies (recycled water)	n/a	Pg. 5-20
X	X	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System supplies	6-7	Pg. 5-30

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 6.2.10	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water Supplier to address water supply reliability in average, single-dry, and for a period of drought lasting five consecutive water years.	System supplies	6-7	Pg. 10-10
X	X	Section 6.3 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a Supplier can readily obtain.	System suppliers, energy intensity	O-1A, O-1B, O-1C, and O-2	Appendix I
X	X	Section 7.1	10634	Provide information on the quality of existing sources of water available to the Supplier and the manner in which water quality affects water management strategies and supply reliability.	Water supply reliability assessment	n/a	Pg. 7-1
X	X	Section 7.2	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the Supplier with the total projected water use over the next 20 years.	Water supply reliability assessment	7-2, 7-3, and 7-4	Pg. 9-1
X	X	Section 7.2.3	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water supply reliability assessment	n/a	Appendix J
X	X	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water supply reliability assessment	n/a	Pg. 9-9
X	X	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts five consecutive years.	Water supply reliability assessment	n/a	Pg. 9-10
X	X	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water supply reliability assessment	n/a	Pg. 10-4
X	X	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the Supplier with the total projected water use for the drought period.	Water supply reliability assessment	7-5	Pg. 9-10

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water supply reliability assessment	n/a	Pg. 10-9
X	X	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water shortage contingency planning	n/a	Appendix E
X	X	Chapter 8	10632(a)(1)	Provide an analysis of water supply reliability (from Guidebook Chapter 7) in the WSCP.	Water shortage contingency planning	n/a	Appendix E, Pg. 4-5
X	X	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the Supplier will use each year to determine its water reliability.	Water shortage contingency planning	n/a	Appendix E, Pg. 4-1
X	X	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the Supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water shortage contingency planning	n/a	Appendix E, Pg. 4-1
X	X	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10%, 20%, 30%, 40%, 50% shortage, and greater than 50% shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water shortage contingency planning	n/a	Appendix E, Pg. 5-5
X	X	Section 8.3	10632(a)(3)(B)	Suppliers with an existing WSCP that uses different water shortage levels must cross reference their categories with the six standard categories.	Water shortage contingency planning	8-1	n/a
X	X	Section 8.4	10632(a)(4)(A)	Suppliers with WSCPs that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water shortage contingency planning	8-2	Appendix E, Pg. 5-3
X	X	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water shortage contingency planning	8-3	Appendix E, Pg. 6-1

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water shortage contingency planning	8-2	Appendix E, Pg. 7-3
X	X	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to State-mandated prohibitions are appropriate to local conditions.	Water shortage contingency planning	Table 8-3	Appendix E, Pg. 6-1
X	X	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water shortage contingency planning	8-2 and 8-3	Appendix E, Pg. 5-1
X	X	Section 8.4.6	10632.5	The UWMP shall include a seismic risk assessment and mitigation plan.	Water shortage contingency plan	n/a	Pg. 8-3
X	X	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water shortage contingency planning	n/a	Pg. 9-1
X	X	Section 8.5	10632(a)(5)(B), 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water shortage contingency planning	n/a	Pg. 9-1
X	n/a	Section 8.6	10632(a)(6)	Retail Supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water shortage contingency planning	n/a	n/a
X	X	Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the Supplier to enforce shortage response actions.	Water shortage contingency planning	n/a	Appendix E, Pg. 10-1
X	X	Section 8.7	10632(a)(7)(B)	Provide a statement that the Supplier will declare a water shortage emergency per Water Code Chapter 3. Water Shortage Emergencies.	Water shortage contingency planning	n/a	Appendix E, Pg. 10-1
X	X	Section 8.7	10632(a)(7)(C)	Provide a statement that the Supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water shortage contingency planning	n/a	Appendix E, Pg. 9-13

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water shortage contingency planning	n/a	Appendix E, Pg. 10-14
X	X	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water shortage contingency planning	n/a	Appendix E, Pg. 10-14
X	n/a	Section 8.8	10632(a)(8)(C)	Retail Suppliers must describe the cost of compliance with Water Code Chapter 3.3, Excessive Residential Water Use During Drought.	Water shortage contingency planning	n/a	n/a
X	n/a	Section 8.9	10632(a)(9)	Retail Suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data are collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water shortage contingency planning	n/a	n/a
X	X	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the WSCP to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water shortage contingency planning	n/a	Appendix E, Pg. 10-10
X	n/a	Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water shortage contingency planning	n/a	Appendix E, Model Drought Ordinance (Appendix B)
X	X	Section 8.12	10632(c)	Make available the WSCP to customers and any city or county where it provides water within 30 days after adoption of the plan.	Water shortage contingency planning	n/a	Pg. 1-6
X	n/a	Sections 9.1	10631(e)(1)	Retail Suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand management measures	n/a	n/a
n/a	X	Sections 9.2	10631(e)(2)	Wholesale Suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and Supplier assistance program.	Demand management measures	n/a	Pg. 1-10

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	n/a	Chapter 10	10608.26(a)	Retail Suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan adoption, submittal, and implementation	n/a	n/a
X	X	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the Supplier provides water that the Supplier will be reviewing the UWMP and considering amendments or changes to the plan.	Plan adoption, submittal, and implementation	10-1	Pg. 1-6
X	X	Section 10.4	10621(f)	Each urban water Supplier shall update and submit its 2025 plan to DWR by July 1, 2026.	Plan adoption, submittal, and implementation	n/a	Pg. 1-1
X	X	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the Supplier made the UWMP and WSCP available for public inspection, published notice of the public hearing, and held a public hearing about the UWMP and WSCP.	Plan adoption, submittal, and implementation	n/a	Pg. 1-6
X	X	Section 10.2.2	10642	The Supplier is to provide the time and place of the hearing to any city or county within which the Supplier provides water.	Plan adoption, submittal, and implementation	10-1	Pg. 1-6
X	X	Section 10.3.2	10642	Provide supporting documentation that the UWMP and WSCP has been adopted as prepared or modified.	Plan adoption, submittal, and implementation	n/a	Appendix B
X	X	Section 10.4	10644(a)	Provide supporting documentation that the Supplier has submitted their UWMP to the California State Library.	Plan adoption, submittal, and implementation	n/a	Appendix B
X	X	Section 10.4	10644(a)(1)	Provide supporting documentation that the Supplier has submitted their UWMP to any city or county within which the Supplier provides water no later than 30 days after adoption.	Plan adoption, submittal, and implementation	n/a	Appendix B
X	X	Sections 10.4.1 and 10.4.2	10644(a)(2)	The UWMP, or amendments to the UWMP, submitted to DWR shall be submitted electronically.	Plan adoption, submittal, and implementation	n/a	Pg. 1-6

Retail	Wholesale	2025 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	Relevant Submittal Table	2025 UWMP Location
X	X	Section 10.7.2	10644(b)	If revised, submit a copy of the WSCP to DWR within 30 days of adoption.	Plan adoption, submittal, and implementation	n/a	Appendix E
X	X	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its UWMP with DWR, the Supplier has or will make the plan available for public review during normal business hours.	Plan adoption, submittal, and implementation	n/a	Appendix B
X	X	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its WSCP with DWR, the Supplier has or will make the plan available for public review during normal business hours.	Plan adoption, submittal, and implementation	n/a	Appendix B
X	X	Section 10.6	10645(c)	If Supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan adoption, submittal, and implementation	n/a	n/a

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2025 UWMP Appendix D

Documentation of Water Authority Supplies

Documentation of Water Authority Supplies Written Contracts or Other Proof

The Water Authority's long-term water supply portfolio includes a combination of imported water supplies, local and regional supply development, carryover storage programs, and operational exchange agreements designed to support regional reliability and drought resilience. In addition to physical water supplies, the Water Authority maintains storage, exchange, and conveyance arrangements that provide operational flexibility and support implementation of the region's long-term water resource strategy under a range of hydrologic conditions.

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 the 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.

Second Amended and Restated Agreement between Metropolitan and the Water Authority for the Exchange of Water (June 2, 2025). This agreement implements a settlement (2025 settlement) between the Water Authority and Metropolitan regarding rates and the price term provided in the 2003 Exchange Agreement. The revised exchange agreement framework established through the 2025 settlement supports implementation of regional exchange arrangements utilizing conserved QSA supplies. These exchange arrangements support operational flexibility, regional reliability objectives, and long-term water supply cost management, and are incorporated into the Water Authority's water demand forecasts discussed in Chapter 2, *Water Demands*, of the 2025 UWMP.

Exchange Agreement between the Water Authority and Western Municipal Water District (March 2026). Pursuant to the revised exchange agreement framework established through the 2025 settlement between the Water Authority and Metropolitan, this agreement establishes a long-term regional exchange arrangement utilizing conserved QSA supplies to support operational flexibility, regional reliability objectives, and long-term water supply costs management.

Exchange Agreement between the Water Authority and Eastern Municipal Water District (April 2026). Pursuant to the revised exchange agreement framework established through the 2025 settlement between the Water Authority and Metropolitan, this agreement establishes a long-term regional exchange arrangement utilizing conserved QSA supplies to support operational flexibility, regional reliability objectives, and long-term water supply cost management.

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 Senate Bill 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 (December 18, 2002). The USFWS issued the Biological Opinion and Incidental Take statement for water transfer activities involving the USBR and associated with IID/other California water agencies' actions on listed species in the Imperial Valley and Salton Sea (per the EIR dated June 28, 2002).

Addendum to EIR for Conservation and Transfer Agreement. IID as lead agency and the Water Authority as a responsible agency approved an Addendum to the EIR in October 2003.

Environmental Impact Statement (EIS) for Conservation and Transfer Agreement. The USBR issued a Record of Decision on the EIS in October 2003.

CA Department of Fish and Game (CDFG) California Endangered Species Act (CESA) Incidental Take Permit #2081-2003-024-006). The CDFG issued this permit on October 22, 2004, 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 EIR dated June 28, 2002).

CESA Permit. A CESA permit was issued by the 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 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 (DWR) - 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 DWR - 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 DWR 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 the 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 the 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 DWR 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).

Construction and Permitting Agreement for Phase 2 of the Mid-Canal Storage Project, and Agreement for Payment of Construction Costs and Repayment Obligation to the United States, dated 3/27/2023. The Water Authority funded a portion of the costs for the Coachella Mid-Canal Storage Project implemented in 2023, which modified a section of the canal to create storage capacity aimed at providing operational flexibility and reducing long-term repair costs.

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.

Seventh Addendum to the Final EIR (May 2022). 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 August 26, 2022. The Seventh Addendum covers additional details regarding the modifications to the Carlsbad Desalination Plant Intake and Discharge Facilities.

Eighth Addendum to the Fina EIR (January 2025). 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 January14, 2025. The Eighth Addendum covers sampling seawater at two locations within the Carlsbad Desalination Plant (CDP) by pumping the seawater up to a barrel sampler, filtering the seawater through a plankton net in the barrel sampler, discharging the filtered seawater back to its source, collecting the plankton retained by the net, and transporting the plankton in seawater to a Marine Research Portable Container located onsite.

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. The Water Authority's carryover storage assets provide an important component of the region's long-term reliability strategy by supporting dry-year supply management, operational flexibility, emergency response capabilities, and implementation of adaptive water management strategies during changing hydrologic conditions.

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. In 2026, the Water Authority executed agreements to transfer its remaining stored water supplies and assign substantially all associated storage capacity rights within the Semitropic Water Bank program as part of a broader long-term operational and financial management strategy.

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.

Water Sale, Return Capacity Lease, and Exchange Agreement between Metropolitan and the Water Authority (February 2022). Water Authority agrees to sell 4,200 acre-feet of stored water from its Semitropic Storage Account and lease return capacity in the California Aqueduct to Metropolitan.

Assignment and Assumption Agreement between Westside Agriculture LLC (April 2026). This agreement provides for the assignment of the Water Authority 's remaining stored water and substantially all associated banking rights within the Semitropic Groundwater Storage Program. The agreement supports optimization of long-term storage assets, reduction of ongoing program liabilities and operational costs, and implementation of the Water Authority's broader water supply reliability and financial management strategies.

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.

2025 UWMP Appendix E

Water Shortage Contingency Plan

2025 Water Shortage Contingency Plan



San Diego County Water Authority

JUNE 25, 2026

Water Shortage Contingency Plan

San Diego County Water Authority

Dan Denham, General Manager
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This plan prepared under the direction of:

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LIST OF ACRONYMS AND ABBREVIATIONS

AF	acre-feet
AFY	acre-feet per year
Board of Directors	Water Authority Board of Directors
CII	Commercial, Industrial, and Institutional
ECSP	Emergency and Carryover Storage Project
CSPG	Carryover Storage Policy Guidelines
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
ICS	Incident Command System
IID	Imperial Irrigation District
Carlsbad Desalination Plant	Claude "Bud" Lewis Carlsbad Desalination Plant
MAAT	Member Agency Advisory Team
M&I	municipal and industrial
Metropolitan	Metropolitan Water District of Southern California
MGD	Million Gallons per Day
Model Drought Ordinance	Model Drought Response Conservation Program Ordinance
PSAWR	Permanent Special Agricultural Water Rate
RSF	Rate Stabilization Fund
SANDAG	San Diego Association of Governments
SB	Senate Bill
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

Section 1 Introduction

1.1 Introduction

The San Diego County Water Authority's (Water Authority) Board of Directors approved a *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 San Diego 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 a year later in response to the Metropolitan Water District of Southern California (Metropolitan) drawing water from storage to meet demands. It was deactivated in 2011, when supply conditions improved.

In 2008, the Board of Directors 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. The Board of Directors adopted Resolution 2008-11 establishing procedures to administer the supply allocation methodology contained in the DMP.

Using lessons from previous shortage periods, in 2012, the DMPs 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 2017, to ensure 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). The plan was renamed for consistency with the long-term framework contained in the state's 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 of Directors in August 2017. 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.

In response to a multi-year drought, Governor Newsom signed a series of executive orders between 2021 and 2023. In 2021, EO N-10-21 called on all Californians to voluntarily reduce their water use by 15% from 2020 levels. To support this directive, the Water Authority

activated Level 1 of the WSCP in October 2021. As drought conditions persisted, the Governor issued EO N-7-22 in March 2022, which strengthened drought response measures, including potential triggers for Level 2 actions and restrictions on irrigation of non-functional turf. In early 2023, EO N-3-23 emphasized long-term water resilience and allowed for modification of prior drought mandates. The first few months of 2023 brought a series of atmospheric rivers and historically wet winter throughout California and the west improving water conditions significantly. On March 24, 2023, the Governor rescinded many emergency drought provisions, and the Water Authority formally deactivated its WSCP in June 2023. Due to the advanced planning efforts of the Water Authority and its member agencies, a smooth transition occurred between changes in water allocations during the first two activations of the drought planning document, and an avoidance of water allocations during the third occasion. Those planning efforts also resulted in a framework supporting regional consistency in public drought messaging.

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. Over the last several decades, the Water Authority and its member agencies have developed a more drought-resilient mix of water resources, thereby increasing the region's ability to manage and avoid shortage situations. In partnership and with 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 Claude "Bud" Lewis Carlsbad Desalination Plant (Carlsbad Desalination Plant), which has a capacity of 54 million gallons per day (MGD). This facility, the largest seawater desalination plant in North America, has been in operation since December 2015 and provides a long-term drought resilient water supply for the San Diego region. Additionally, the San Vicente Dam raise, completed in 2014, provides both emergency storage project (ESP) water and carryover storage project (CSP) water for the region as defined by those specific projects. CSP capacity allows the region to store water in years when supplies are available and utilize it during periods of drought.

The Water Authority's supply portfolio also includes senior-priority conserved Colorado River supplies negotiated through the 2003 Quantification Settlement Agreement (QSA). The Water Authority's QSA supplies include 200,000 AFY through the Water Conservation and Transfer Agreement with the IID and 77,700 AFY conserved water generated through the lining of the All-American Canal and Coachella Canal. The QSA supplies represent more than half of the region's water. In 2026, the Water Authority executed out-of-region exchange agreements with Riverside County's Eastern Municipal Water District and Western Municipal Water District. The agreements aimed at managing long-term operational and financial flexibility that commit the Water Authority to delivering a total of 20,000 AF of its conserved QSA water to these two agencies annually for a period of 21 years. These out-of-region exchanges constitute a new demand category within the Water Authority's 2025 UWMP reliability analysis.

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 is an important ongoing component of the Water Authority's long-term strategy to build water resilience in the San Diego Region. For more than 30 years, the Water Authority and its member agencies have used outreach, education, and incentive programs to achieve conservation and increased water use efficiency. These efforts have resulted in a per-capita water use decrease of more than 50% since 1990 and reduced need for imported water to meet regional demands.

In September 2020, the Water Authority Board of Directors 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.

While the Water Authority and its member agencies have developed a resilient water supply portfolio over the last few decades, 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 a 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 on 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 Key Legislative Actions

1.4.1 Senate Bill X7-7

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 December 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. However, the Water Authority, as the wholesale water

[1] *Drought in California*, California Department of Water Resources, Natural Resources Agency, January 2021, p. 4

supplier, supports its retail member agencies' efforts to comply with SBX7-7 through regional programs and education.

1.4.2 Senate Bill 606 and Assembly Bill 1668

On May 9, 2016, Governor Brown issued EO B-37-16, which built on temporary statewide emergency water restrictions to establish long-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 called for long-term improvements in local drought 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 AB 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. In 2024, the SWRCB adopted water use efficiency targets for retail water agencies across the state. If retailers do not meet the adopted targets by 2027, they will be subject to fines and penalties.

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 2025 UWMP, is also discussed. An overview of the Water Authority's actions to manage the San Diego 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 the 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: Additional and 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 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 of Directors 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*:* Water Use Prohibitions

Appendix D*:* Multi-Jurisdictional Hazard Mitigation Plan

Appendix E*:* Water Authority Board of Directors Resolution No. 2026-

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, its subsequent updates as part of the Water Authority's 2020 and 2025 UWMPs, 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 of Directors. 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. The involvement of all member agencies was key to the successful preparation of the plan as this 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. *Water Authority CSP supplies will be managed and utilized to assist in meting M&I demands during drought periods.*
7. *The Water Authority will consider securing options and/or spot water transfers to meet the reliability goal set by the Board of Directors. 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;*
    - *Flexibility 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 San Diego 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 maximize 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 San Diego region, it is very important for the allocation methodology to avoid large, uneven retail impacts across the San Diego 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 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 Water Authority Board of Directors' Water Planning Committee for consideration. The DMP elements were presented to the Water Authority Board of Directors 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, Metropolitan allocated supplies to its member agencies, including the Water Authority, from July 2009 to April 2011. In response to the allocation from Metropolitan, 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 Metropolitan 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 Water Authority Board of Directors 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 Water Authority Board of Directors' 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 Water Authority Board of Directors 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), Water Authority Board of Directors-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 EO 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 updated in the 2017 WSCP.

2.4 2020 Water Shortage Contingency Plan

In 2018, with the passage of SB 606, the California Water Code was amended to include new requirements related to water shortage contingency planning (Section 10632). The 2017 WSCP was prepared in anticipation of these new requirements and as a result, only minimal, non-substantive updates were required during the 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.

2.5 2025 Water Shortage Contingency Plan

During the 2021-2023 drought, the SWRCB adopted an emergency regulation that required local water suppliers to implement conservation actions under Level 2 of their WSCPs. Since the San Diego region was not experiencing a water supply shortage, the Water Authority implemented its Level 2 actions, consistent with the regulation, but did not formally activate Level 2 of its WSCP. Level 2 actions included continued voluntary water use efficiency measures and use of the WSCP's communication plan. In order to avoid future variations between State mandates and the Water Authority's drought actions, the Water Authority implemented changes to the WSCP's drought response matrix (Table 5-1). The drought response matrix outlines potential drought actions available to the Water Authority to utilize at each regional shortage level. The drought response matrix was updated in the 2025 WSCP to allow for more flexibility in the process for selecting shortage levels and allow for drought response actions to be tailored to local conditions, rather than statewide mandates.

2.6 Plan Re-Evaluation

The WSCP will be re-evaluated at least every five years in coordination with the UWMP 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.

Section 3
Historic Drought Response and Shortage Management Actions

The Water Authority has activated its drought planning document three times since 2006. The first time was during the period of 2007 to 2011. During that period, the document was known as the DMP and was activated in response to Metropolitan 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 Metropolitan. In 2017, the WSDRP was updated and renamed the WSCP to be consistent with the state's long-term framework contained in the April 2017 Final Report, *Making Water Conservation a California Way of Life, Implementing EO B-37-16*. In 2021, the WSCP was activated for the third time in response to Governor Newsom's declaration of a statewide drought emergency. Due to the advanced planning efforts of the Water Authority and its member agencies, there was a smooth transition into and out of water allocations during the first two activations of the drought planning document, and an avoidance of water allocations altogether on the third instance. 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)

3.1.1 2007

The 2007–2011 California drought marked the beginning of increased restrictions on State Water Project 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, Metropolitan notified its member agencies that it expected challenges in meeting demands due to insufficient imported water supplies from the State Water Project and the Colorado River. In order to meet demands, Metropolitan 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. Metropolitan adopted its WSDM in 1999 as guidance for managing regional water supplies during both surplus and shortage situations. Metropolitan'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 San Diego region.

3.1.2 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, Metropolitan's Board of Directors voted to allocate urban water deliveries to its member agencies in 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 San Diego region's water supply portfolio helped offset some of the required cutbacks from Metropolitan. 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.

3.1.3 2011

Supply conditions continued to improve throughout the winter and into the spring of 2011. Storage water began to rise to levels seen before the start of the 2007 drought. In April 2011, Metropolitan terminated water 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	Metropolitan announced it will need to draw from storage supplies to meet expected 2007 demands, consistent with its WSDM.
May 2007	Water Authority moved into DMP Stage 1, Voluntary Supply Management (triggered by Metropolitan 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	Metropolitan announced plans to reduce agricultural deliveries to customers participating in the IAWP by 30%, effective January 1, 2008, consistent with WSDM.
December 2007	Water Authority Board of Directors 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	Metropolitan implemented 30% cutback to IAWP participants, consistent with Metropolitan's WSDM.

February 2008	Metropolitan approved its 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 and State Water Project.
June 2008	Governor Schwarzenegger proclaimed statewide emergency due to drought and issued EO 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 27th.
April 2009	Metropolitan announced allocation of M&I deliveries to its member agencies, including estimated 13% cutback to San Diego region for FY 2010. Water Authority Board of Directors 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 of Directors 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 Central Valley Project and State Water Project 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 of Directors 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	Metropolitan terminated implementation of its WSAP and IAWP supply cutbacks. Water Authority discontinued M&I water supply allocations to member agencies, deactivated WSDRP (formerly DMP), suspended special agricultural water rate cutbacks, and declared an end to the drought response levels contained in Model Drought Ordinance.

3.2 Significant Drought and Shortage-Related Events (2014 to 2017)

3.2.1 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 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 included mandatory water-use restrictions with a regional savings target of up to 20%.

3.2.2 2015

Dry conditions continued to worsen into the fourth year in the spring of 2015, as reflected by a record low level of snow water content (5% of average for April 1st) in the northern Sierra Nevada. On April 1, 2015, the governor directed the SWRCB to impose restrictions on urban supplies 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, Metropolitan's Board of Directors 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 Transitional Special Agricultural Water Rate 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 Metropolitan. The Metropolitan 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 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 San Diego 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 consider 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.

3.2.3 2016

In February 2016, the SWRCB amended the emergency regulation to allow for adjustments to the conservation standards, including new local drought-resilient supplies developed after 2013. In March 2016, the SWRCB certified supply from the Carlsbad Desalination Plant as drought-resilient, which lowered the range of member agencies' conservation standards 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 the drought-stricken state. In March 2016, the Water Authority Board of Directors revised its regional drought management actions, rescinding its declaration of a Level 2 Drought Alert condition under the Model Drought Ordinance, recognizing that the SWRCB individual water supply conservation standards are driving member agency-specific water-use restrictions, rather than regional restrictions.

In May 2016, due to the improved supply conditions and sufficient supply availability, Metropolitan 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 considered local supply investments and actual shortages being experienced within a community. Utilizing the conservation 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.

3.2.4 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 Water Authority Board of Directors 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 EO B-40-17, which lifted the drought emergency in all California counties except Fresno, Kings, 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 San Diego 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 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 increased statewide conservation.
July 2014	SWRCB adopted an emergency regulation for statewide urban conservation. The 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	Metropolitan revised its WSAP.
April 2015	Governor Brown issued EO B-29-15, instituting emergency actions and mandatory water-use restrictions for California. Metropolitan imposed Level 3

	under its WSAP, effective July 2015, reducing Metropolitan supplies by 15%.
May 2015	SWRCB issued additional requirements to its emergency regulation, including mandatory water-use restrictions 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 Transitional Special Agricultural Water Rate 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 EO B-36-15 calling for extensions of urban water use restriction through October 2016, should drought conditions persist through January 2016, and directed SWRCB to consider modifying restrictions.
February 2016	SWRCB extended the emergency regulation through October 2016 and allowed 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 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%. The Water Authority modified its shortage management actions, adopting Ordinance No. 2016-01 and rescinding Ordinance No. 2015-02. Actions included continuing to allocate supplies to member agencies in FY 2016 under WSRDP Stage III, Mandatory Supply Cutback, but rescinding the July 2014 notification of a regional Level 2, Drought Alert condition.
May 2016	Governor Brown issued EO B-37-16. Metropolitan 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 of Directors 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 EO B-40-17, which lifted the drought emergency in all California counties except Fresno, Kings, Tulare, and Tuolumne.

3.3 Significant Drought and Shortage-Related Events (2021 to 2023)

3.3.1 2021

After two consecutive years of drought and historically low precipitation in California, in April 2021, Governor Newsom proclaimed a drought emergency for the Russian River watershed in Sonoma and Mendocino counties. As part of this action, the governor directed state agencies to take immediate action to bolster drought resilience and prepare for impacts on communities, businesses, and ecosystems if dry conditions extend to a third year. In response to historic and unanticipated reductions in the amount of water flowing to the state's major reservoirs, the governor expanded the emergency proclamation in May 2021. In July 2021, the governor signed another drought emergency proclamation to include 50 out of the state's 58 counties. In addition to the proclamation, the governor signed an executive order that called on Californians to voluntarily reduce their water use by 15% compared to 2020 water use levels.

In August 2021, the United States Bureau of Reclamation declared the first ever shortage on the Colorado River for calendar year 2022 (Tier 1), triggering mandatory water cuts to Lower Basin states Arizona and Nevada, and Mexico. Due to its senior water rights on the river, California was not required to make cuts. Also in August 2021, Metropolitan's board declared a Level 2 Water Supply Alert, calling on residents to voluntarily reduce their water consumption to preserve the San Diego region's storage reserves.

Due to sustained and extreme high temperatures, decreased reservoirs levels throughout California, and long-range weather forecasts for the winter indicating the potential for continued drought conditions, Governor Newsom declared a statewide emergency in October 2021 that included all 58 counties. As part of this action, the governor directed all water suppliers to execute their WSCPs at a level appropriate to local conditions, considering the possibility of a third consecutive dry year. To support the call for a voluntary reduction in water use, the Water Authority's Board of Directors authorized the activation of its WSCP at Level 1. WSCP Level 1 actions include ongoing voluntary water-use efficiency measures and implementation of the WSCP's communication plan. In November 2021, Metropolitan declared a drought emergency and called on people across Southern California to step up conservation efforts but focused especially on the water agencies in the State Water Project dependent areas.

3.3.2 2022

The 2022 water year started off strong with a series of storms in the fall of 2021, however, California then experienced the driest January through March in more than 100 years. As such, drought conditions continued into a third consecutive year as the statewide snowpack for water year 2022 reached only 35% of average through April. Following the dry winter of 2022, the 2020 – 2022 period became the driest three years ever recorded in California, surpassing the previous record set during the drought of 2013 – 2015.

In January 2022, the SWRCB adopted an emergency regulation that prohibited certain wasteful water use practices statewide, including the use of potable water to clean hard surfaces or driveways and the use of ornamental fountains. After the historically dry winter, in March 2022, Governor Newsom issued an executive order that called upon the SWRCB to consider adopting

emergency regulations that required each urban water supplier to move to Level 2 of their WSCPs, and to consider a ban on irrigating non-functional turf. In April 2022, Metropolitan declared a Water Shortage Emergency Condition within the State Water Project dependent area, and adopted the Emergency Water Conservation Program, requiring member agencies within the State Water Project dependent area to implement one-day-per-week water restrictions, or stay within volumetric limits, beginning June 1, 2022. Following the Governor's March 2022 executive order, the SWRCB adopted an emergency water conservation regulation in May 2022 that required local water suppliers to implement conservation actions under Level 2 of their WSCPs for a water shortage of up to 20%, and banned irrigation of turf at commercial, industrial, and institutional properties. Based on the SWRCB's action, the Water Authority implemented its Level 2 actions, consistent with the regulation, but did not formally activate Level 2 of its WSCP. Like the Water Authority's Level 1 actions, Level 2 actions included continued voluntary water use efficiency measures and use of the WSCP's communication plan; however, additional Level 2 measures, including storage withdrawals and spot transfers, were not needed since the San Diego region was not experiencing a water supply shortage.

With the ongoing drought and water supply availability at the forefront of discussions throughout the San Diego region, Metropolitan adopted a resolution in October 2022 that strongly recommended cities and water agencies across Southern California pass ordinances to permanently prohibit the watering and installation of non-functional turf. In December 2022, Metropolitan's Board of Directors adopted a resolution that reaffirmed the Regional Drought Emergency for all its member agencies and announced potential limitations to its core water supplies, indicating the potential for supply allocations in FY 2024 if the drought conditions did not improve in the following months.

3.3.3 2023

After a historic 3-year drought period, an exceptionally wet winter significantly improved supply conditions throughout the state in 2023. From late December 2022 into January 2023, a series of nine powerful atmospheric rivers produced a record amount of rain and mountain snow across California and the western United States. Several more atmospheric rivers hit California and the western United States during the winter of 2023, resulting in above average rainfall and snowpack throughout the state and the Colorado River Basin. At the DWR's location for tracking monthly and annual snowpack in the Sierras, Phillips Snow Station, the April 2023 snowpack was recorded at 126.5 inches, or 221% of average. The snowpack and rainfall that occurred during the 2023 water year significantly improved supply conditions throughout California and the west.

In response to the improved hydrologic conditions, Governor Newsom signed an executive order in March 2023 that terminated the voluntary 15% water conservation target called for in his July 2021 executive order. This also terminated the provision in his March 2022 executive order that resulted in the SWRCB adopting a regulation to require water suppliers to implement their Level 2 actions. Also in March 2023, Metropolitan's Board of Directors removed the Water Shortage Emergency Condition declared in April 2022 that imposed water use restrictions on the State Water Project dependent area. With Level 2 actions no longer required, the SWRCB allowed its regulation to expire in June 2023. With termination of the governor's provisions and the expiration of the SWRCB's regulation, the Water Authority Board of Directors deactivated the WSCP, effective July 1, 2023.

Table 3-3
Timeline of Significant Drought and Shortage-Related Events
(2021 – 2023)

April 2021	Governor Newsom declared a state of emergency in Sonoma and Mendocino counties due to drought conditions in the Russian River Watershed
May 2021	In response to unanticipated reductions in the amount of water flowing to the state's major reservoirs, Governor Newsom expanded his April 2021 drought emergency proclamation to include 41 California counties in total.
July 2021	With California's water supplies continuing to be severely depleted, and high temperatures increasing water loss from reservoirs and streams, Governor Newsom signed another drought emergency proclamation to include a total of 50 of California's 58 counties. The governor also called on Californians to voluntarily reduce their water use by 15 percent compared to 2020 values.
August 2021	The United States Bureau of Reclamation declared the first ever water shortage on the Colorado River for calendar year 2022 (Tier 1), triggering mandatory water cuts to Lower Basin states (Arizona and Nevada), and Mexico. Due to its senior water rights on the river, California was not required to make cuts.
August 2021	Metropolitan declared a Level 2 Water Supply Alert, calling on residents to voluntarily reduce their water consumption to preserve the San Diego region's storage reserves.
October 2021	Governor Newsom issued an executive order to expand the drought emergency statewide and to include the counties of Imperial, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Francisco, and Ventura.
October 2021	The Water Authority activated Level 1 of its WSCP
November 2021	Metropolitan declared a Regional Drought Emergency, calling on its' member agencies to reduce the use of State Water Project supplies.
January 2022	SWRCB adopted an emergency regulation that prohibits certain wasteful water use practices statewide, including the use of potable water to clean hard surfaces or driveways and the use of ornamental fountains,
March 2022	Governor Newsom issued an EO that called upon the SWRCB to consider adopting a regulation that requires local water suppliers to move to Level 2 of their WSCPs
April 2022	Metropolitan declared a Water Shortage Emergency Condition within the State Water Project dependent area, and adopted the Emergency Water Conservation Program, requiring member agencies within the State Water Project dependent area to implement one-day-per-week water restrictions, or stay within volumetric limits, beginning June 1, 2022.
May 2022	The SWRCB adopted an emergency water conservation regulation in response to the governor's March 2022 EO. The regulation required all urban water suppliers to implement conservation actions under Level 2 of their WSCPs, and banned irrigating turf at commercial, industrial, and institutional properties.
October	Metropolitan adopted a resolution to recommend that local water agencies across

2022	Southern California pass ordinances that bans the use of potable water to irrigate non-functional turf, and permanently prohibit the installation of non-function turf at any new or existing non-residential properties.
December 2022	Metropolitan adopted a resolution that reaffirmed the Regional Drought Emergency for all member agencies and announced potential limitations to its core water supplies, indicating the potential for supply allocations in FY 2024.
March 2023	Governor Newsom signed an EO that terminated the voluntary 15% water conservation target called for in his July 2021 executive order. This also terminated the provision in his March 2022 executive order that resulted in SWRCB adopting a regulation to require water suppliers to implement their Level 2 WSCP actions.
March 2023	Metropolitan rescinded the Water Shortage Emergency Condition declared in April 2022 that imposed water use restrictions on the State Water Project dependent area. Regional Drought Emergency and Statewide Drought Declaration remained in effect.
June 2023	The Water Authority Board of Directors deactivated Level 1 of its WSCP, effective July 1, 2023.

3.4 Lessons Learned

As noted at the beginning of Section 3, the Water Authority has activated its shortage management plan three times since 2006. The first time, in 2007 when it was named the DMP, was in response to Metropolitan'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 Metropolitan. The WSDRP was deactivated in 2016. The Water Authority activated its shortage management plan (now named the WSCP) for a third time in 2021 in response to Governor Newsom's statewide emergency drought proclamation and call for voluntary water conservation. In the first two instances, the San Diego region was able to smoothly and successfully transition into and out of allocations, and during the third instance, supply allocations were avoided altogether. This reflects the comprehensiveness of the documents and coordinated effort that went into the preparation of the documents. Because activation of the previous two versions of the shortage management documents (DMP and WSDRP) were successful, the WSCP retains the same allocation methodology and many of the same elements included in the DMP and WSDRP.

In addition to the successful activation and deactivation of the DMP, WSDRP, and WSCP, the advanced planning and foresight shown by the Water Authority and its member agencies after the drought in the early 1990s prepared the San Diego 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 35 years of aggressive water use efficiency programs, ensured sufficient water supplies for the San Diego 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. While some parts of the state were experiencing severe drought conditions and stringent cutbacks from their local water supplier, the Water Authority was able to avoid allocating supplies during the most recent drought period from 2021 – 2023, due to its diverse and drought-resilient water supply portfolio.

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 San Diego region can be subject to messaging from Metropolitan that is designed to target Metropolitan'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 existed 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.

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 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 Metropolitan. The supply risks are the result of factors such as climate change, drought, and regulatory permitting.

California Water Code Section 10632(a) requires an annual water supply and demand assessment (annual assessment) be conducted to ensure that the Board of Directors, member agencies, the public, and state and local agencies are informed as to the San Diego 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. The water supply reliability assessment and the drought risk assessment conducted in the 2025 UWMP show no supply shortages. 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, out-of-region exchanges, 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 latest Water Authority Board of Directors' established Carryover Storage Policy Guidelines (CSPG) adopted in April 2025 (See Section 4.1.3 and 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 member agency 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 member agency 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 Carlsbad Desalination Plant, the QSA, and Metropolitan. 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 Carlsbad Desalination Plant commenced commercial operations in December 2015. It delivers a reliable local treated water supply of up to 56,000 AFY. Of the plant's total annual production, 6,000 AFY is designated as a local supply for two Water Authority member agencies.

Quantification Settlement Agreement

In 2003, as part of the execution of the QSA, the Water Authority and IID executed an amendment to a 1998 transfer agreement that makes Colorado River water voluntarily conserved by Imperial Valley farmers with funding from the Water Authority 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 base volume of water annually available to the Water Authority through the transfer agreement reached its peak of 200,000 AFY in 2021. The conserved transfer supplies continue through 2047 and can be extended through 2077 if both parties agree. The Water Authority, under the QSA, also contracted for 77,700 AFY of conserved water from projects to line the All-American Canal and Coachella Canal, which were funded by the Water Authority with support from the state. The canal lining supplies continue through 2112. Collectively, the conserved water transfer supplies and canal lining supplies are considered Priority 3(a) water and have a higher priority than that of several other water users on the Colorado River, including Metropolitan. Metropolitan Water District of Southern California

Under normal conditions, Metropolitan is able to meet the Water Authority's supplemental water needs. However, during drought conditions, Metropolitan may implement its WSAP and allocate water to its member agencies. Under Metropolitan's WSAP, Metropolitan's process is to declare an allocation in April and inform its member agencies, including the Water Authority, of any potential cutback and the agency's allocation for the subsequent fiscal year (FY), which starts July 1. That information is factored into the Water Authority's annual assessment.

4.1.2 Projected Water Demands on the Water Authority

Member Agency Demand

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), non-PSAWR agricultural demand, and water used for commercial, industrial, and institutional (CII) purposes.

Short-term water use trends in the San Diego region are closely linked to the economy and weather. With sustained economic growth and increasing population through the early 2000s, the San Diego region saw significant increases in the region's water demands. However, water demands peaked in 2007 and have since experienced periods of decline that can be linked to specific disruptive events. These factors include Metropolitan supply allocations, implementation of member agency mandatory water-use restrictions, an extraordinary conservation ethic, state-mandated emergency water regulations, recession, a series of alternating dry and wet years and a global pandemic. While some water demand recovery was seen following specific disruptors, the series of events resulted in a hardening of lower water use behaviors.

Out-Of-Region Exchanges

Out-of-region exchanges represent a new demand category for the Water Authority made available through a settlement agreement executed by the Water Authority and Metropolitan in 2025, which established the ability for the Water Authority to deliver conserved QSA supplies to Metropolitan and its member agencies. In early 2026, the Water Authority executed water delivery exchange agreements with Western and Eastern Municipal Water Districts aimed at managing long-term costs and regional reliability. These long-term contracts commit the Water Authority to delivering a total of 20,000 AF of its conserved QSA water to these two agencies annually for a period of 21 years. In addition to each agency's 10,000 AF annual commitment, these agreements also included 30,000 AF of pre-purchased supplies for each agency (60,000 AF total), of which a maximum of 10,000 AF per agency can be requested from this deferred amount in a given year. As a contracted water volume, this demand will remain constant regardless of dry weather conditions.

Total Demand on the Water Authority

To project demands on the Water Authority for the annual assessment, the Water Authority collects member agencies' near-term water use estimates, including local supplies which may be influenced by weather and other factors. Member agency estimates are then combined with out-of-region exchanges to determine the total demand on the Water Authority.

4.1.3 Supply Augmentation

If a water supply shortfall is identified based on the assessment of core water supplies and total 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 the CSP. 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 San Diego region during a supply shortage:

1. *Enhanced reliability of the water supply* - During dry weather periods, increased total demand for water may exceed available supplies, resulting in potential water shortages. Carryover storage provides a reliable and readily available source of water for the Water Authority's member agencies 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 State Water Project- 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 *2002 Facilities Master Plan* identified a need for approximately 100,000 AF of carryover storage to assist in maintaining a secure and reliable supply for the San Diego region (Water Authority, 2002). To meet this need, carryover storage was incorporated into to the San Vicente Dam Raise project which was originally pursued as a key element of the Water Authority's ESP and facilitates the reliable and efficient delivery of water to the residents of the Water Authority service area. It is located in the San Vicente Reservoir above the reservoir expansion for the ESP (see *Section 8.2 Emergency Storage Project*), increasing water storage reliability for the San Diego region. Construction was completed in 2014.

Since the original CSPG was established in 2016, regional demands have declined due to conservation, water use efficiency and additional local supplies. The 2024 Water Facilities Master Plan recommended reducing the carryover storage target to better align with current and projected demands, while also creating more operational storage and flexibility. In April 2025, the Water Authority Board of Directors approved an update to the CSPG setting a target carryover storage level of 40,000 AF, with flexibility to adjust based on supply and demand conditions. The policy also requires annual reporting to the Water Authority Board of Directors on the agency's carryover storage, along with its other storage reserves.

Water Authority's Dry-Year Transfer Program

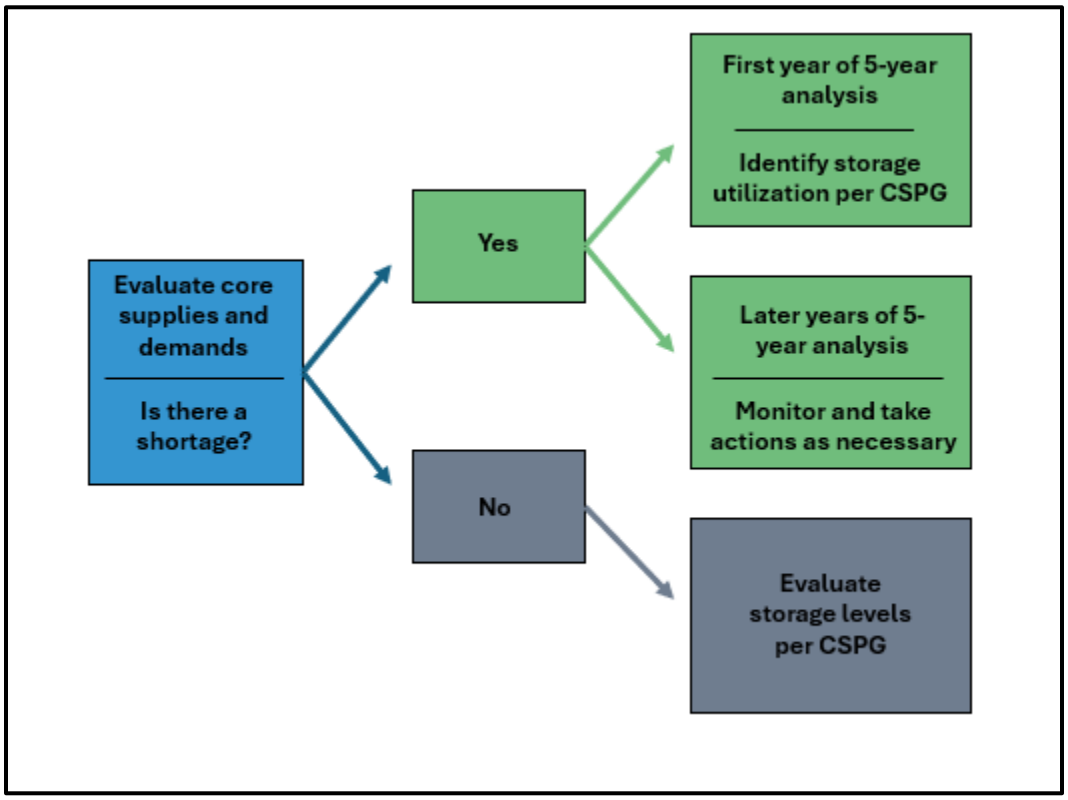
To ensure adequate water supplies during drought conditions and periods of regulatory constraints, the Water Authority may consider securing water transfers as part of its WSCP. Decisions on whether to pursue transfers are based on a range of factors, such as source location, federal and state agency approvals, price, call period, and capacity in the State Water Project 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 2014 - 2017 drought for several 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.

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



4.2 Regional Reliability Assessment Calculation

If a total water supply shortfall still exists after consideration of augmented supplies, the next step is to calculate a regional shortage 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, supplemental water transfer 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 of Directors, in September 2020, approved the PSAWR Program and made it available to eligible customers effective January 1, 2021. Participating Water Authority member agencies pass-through the PSAWR Program rate benefit to their eligible customers. In return, agricultural customers receive half the M&I level of service under the ESP and no deliveries from CSP. The cutback to PSAWR deliveries during a shortage is equivalent to the cutback level from Metropolitan. During the 2014 – 2017 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 Metropolitan.

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 Metropolitan 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 Metropolitan. According to the schedule in Metropolitan's WSDM, 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 of Directors 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 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 including a description of the percent reduction required at each level.

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 Drought Response Matrix, shown in Figure 5-1, provides guidance to the Water Authority Board of Directors to select potential regional actions that would 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. Each of the actions listed in the Drought Response Matrix could reduce the gap between supplies and demands from between 0% to 100% depending on the number of actions implemented and the size of the gap. For example, a 10% gap could be reduced entirely through a communications program that educates the public on the water supply situation. At the same time, that same 10% gap could be reduced by 5% using a limited communications program and another 5% by increasing funding for ongoing water use efficiency programs. Each situation is unique and how the Water Authority proceeds will be at the discretion of the Water Authority Board of Directors.

Figure 5-1
Drought Response Matrix

Regional Water Shortage Levels[2, 3]	Potential Water Authority M&I Drought Response Actions[1]							
	Ongoing Water-Use Efficiency	Communication Plan	Supply Augmentation			Demand Reduction Measures		Member Agency M&I Supply Allocation
			Storage Withdrawals		Spot Transfers, Other	Additional	Extraordinary	
			E&C SP	ESP[4]				
Normal Conditions	✓							
Level 1 Up to 10%	✓	✓	✓					
Level 2 Up to 20%	✓	✓	✓		✓	✓		✓
Level 3 Up to 30%	✓	✓	✓	✓	✓	✓		✓
Level 4 Up to 40%	✓	✓	✓	✓	✓	✓	✓	✓
Level 5 Up to 50%	✓	✓	✓	✓	✓	✓	✓	✓
Level 6 Above 50%	✓	✓	✓	✓	✓	✓	✓	✓

[1] The matrix contains potential Water Authority regional actions. The member agencies can implement local jurisdiction regulations as necessary for their service areas. Actions listed in this table are not in sequential order and can be implemented at any point during a supply shortage at the discretion of the Water Authority's Board of Directors of Supervisors

[2] Supply conditions throughout California may differ from conditions and available supplies in San Diego County. Drought response actions and mandates at the State level will be taken into consideration, however, regional water shortage levels and corresponding response actions will be determined based on local conditions.

[3] The response to a catastrophic emergency could occur under any response level. Potential Water Authority drought response actions include activation of the Integrated Contingency Plan and allocation of Emergency Storage Program supplies

[4] The use of storage supplies from the ESP to mitigate severe shortages requires Board of Directors approval

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, State Water Project 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 Water Authority Board of Directors 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 Water Authority Board of Directors could consider adopting, but based on local and statewide supply conditions, would only decide to implement four of the actions. In addition, the Water Authority Board of Directors 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 of Directors consideration.

The following is a brief description of each of the potential shortage response actions in the Drought Response Matrix.

5.1.1 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. Following the success of long-standing indoor water conservation and efficiency efforts, primary focus shifted to outdoor water efficiency activities. Current outdoor activities include converting non-functional turf to low water landscapes, promoting efficient irrigation system retrofits, onsite stormwater capture, and providing a variety of customer education resources. Ongoing water use efficiency efforts will be coordinated with the Communication Plan and will take place throughout all regional response shortage levels.

5.1.2 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.

5.1.3 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 Water Authority Board of Directors' 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 San Diego 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 San Diego 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.

5.1.4 Call for Additional and Extraordinary Demand Reduction Measures

Demand reduction measures deemed “additional” and “extraordinary" are those measures that reduce regional water demand beyond ongoing water use efficiency activities. Additional demand reduction measures may be implemented when the regional water shortage level reaches Level 2. Examples of additional demand reduction measures include issuing guidelines for irrigation schedules and setting restrictions on outdoor activities such as washing vehicles. Extraordinary demand reduction measures may be implemented when the regional water shortage level reaches Level 4. Examples of an extraordinary demand reduction measures include prohibiting the use of potable water for landscape irrigation, restrictions on filling pools or ornamental ponds, and prohibiting vehicle washing. Implementation of specific demand reduction measures would be implemented by retail water agencies. Please refer to Section 6 for additional information.

5.1.5 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 member agency water use is needed (as early as 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 the severity of drought conditions and the level of water supply shortage. For Level 1, 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. A potential scenario that could trigger a response under Levels 2-6 is a multi-year drought that results in insufficient supplies available to meet total demands, thus requiring supply augmentation and additional demand reduction measures to mitigate the 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 Drought Response – M&I Demand Reduction Level	Scenarios
Level 1 – Up to 10%	➢ *Potential core supply shortage in the near-term* ➢ *Shortage in core supplies, but mitigated through carryover storage reserves* ➢ *Implement communication plan to encourage conservation actions*
Level 2 – Up to 20%	➢ *Water Authority core supplies are not adequate to meet member agency demands* ➢ *Supply augmentation (i.e. carryover storage reserves and/or dry-year transfers)* ➢ *Additional demand reduction measures are needed to reduce demands below the level of available supplies (i.e. guidelines on irrigation schedules or restrictions on outdoor washing activities)* ➢ *Implement M&I supply allocations*
Level 3 – Up to 30%	➢ *ESP storage reserves may be utilized at the Board of Directors' discretion when the regional level of service drops below 75%*
Level 4- Up to 40%	➢ *Extraordinary demand reduction measures are needed to reduce demands below the level of available supplies (i.e. banning the use of potable water for landscape irrigation or vehicle washing)*
Level 5 – Up to 50%	
Level 6 – Above 50%	
Catastrophic Emergency	➢ *Occurs when a disaster, such as an earthquake or other emergency event, results in insufficient available water to meet the San Diego region's needs or eliminates access to imported water supplies*

Section 6
Additional and Extraordinary Demand Reduction Measures

The main purpose of implementing member agency 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 Drought Response Matrix in Section 5 includes additional and extraordinary demand reduction measures as potential drought response actions. This section provides a brief discussion on demand reduction measures and the Water Authority's 2025 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, guiding, and educating the public regarding any potential measures.

6.1 Examples of Additional and 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 are categorized by "additional" and "extraordinary" demand reduction measures. These lists can be 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 San Diego 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 considers 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 Metropolitan, the amount of member agency local supplies available, and the ability of the Water Authority or its member agencies to secure supplemental supplies. Based on an action by the Board of Directors and notification from the Water Authority, the member agency would

[2] Making Water Conservation a California Way of Life, Implementing Executive Order B-37-16. Final Report, April 2017. Page 1-7.

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 San Diego region. Appendix C provides a list of additional and extraordinary water use prohibitions.

Section 7
Municipal and Industrial Supply Allocation Methodology

7.1 Introduction

As outlined in the Drought Response Matrix discussed in Section 5.1, after the Water Authority Board of Directors 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 completely 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.

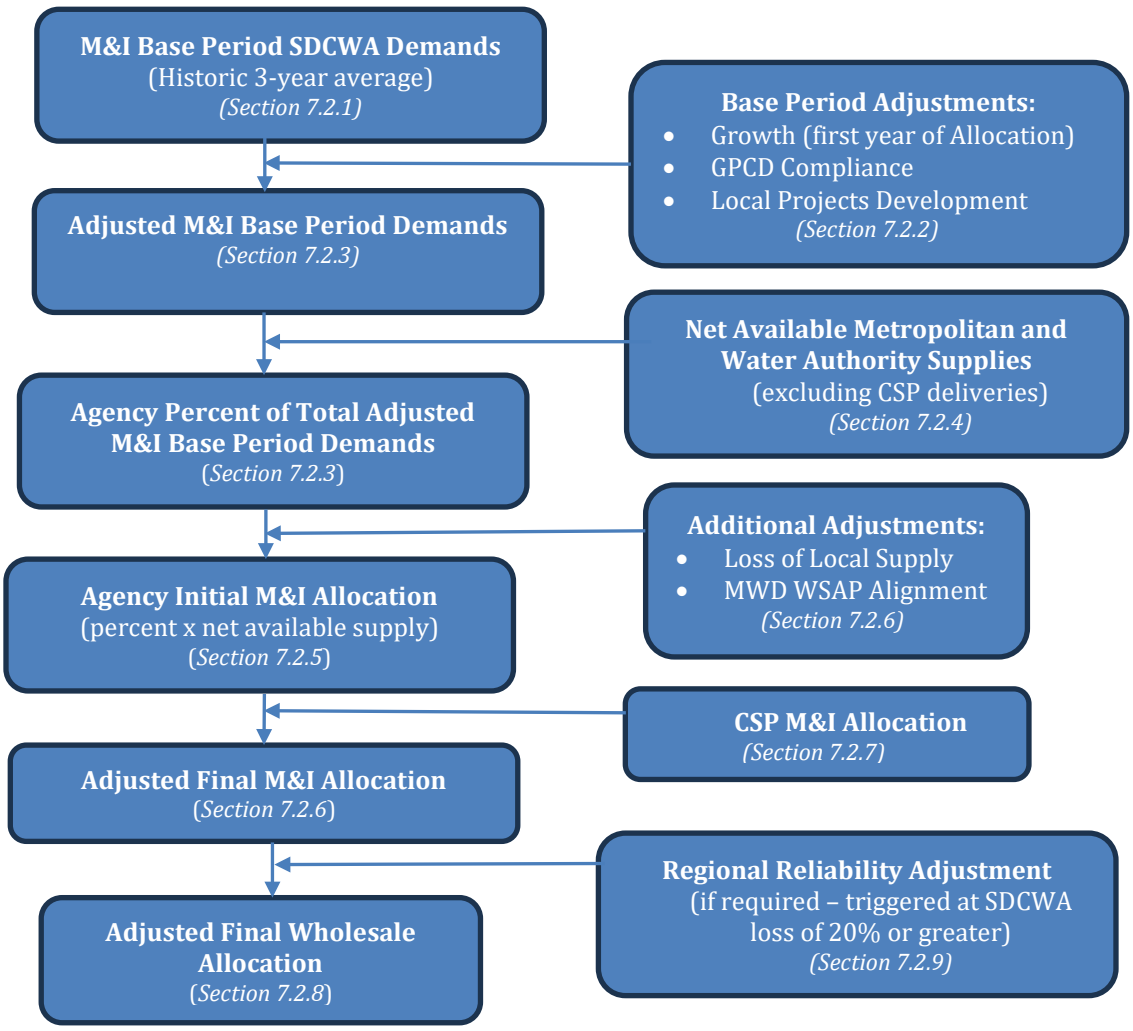
This section includes a description of the M&I supply allocation methodology developed through a collaborative effort between the Water Authority and its member agencies. The goal of the methodology is to provide an equitable means of apportioning the Water Authority's supplies during periods of supply 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 Metropolitan 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. Additionally, the SWRCB adopted new long-term conservation targets in 2024, as directed by SB 606 and AB 1668. Although GPCD targets set forth in the SWRCBs 2024 regulation are intended to supersede conservation targets in SB X7-7, the compliance targets in SB X7-7 are still active. As such, the Water Authority will continue to use SB X7-7 targets for the growth and GPCD compliance adjustment calculations included in the allocation methodology. Additional details regarding key legislative actions can be found in Section 1.4. A final area of review involved the relationship between the Water Authority's methodology and modifications to Metropolitan's WSAP. Alignment between the two allocation plans was necessary when methodological inconsistencies result in unintended and inequitable impacts to the San Diego region or a single member agency. On April 26, 2012, the Water Authority Board of Directors 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 was 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 and supply necessary to meet out-of-region exchange demands described in Section 4.1.2) along with supplies available from Metropolitan. 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 Metropolitan's WSAP alignment, if needed. If the Water Authority Board of Directors 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.

Figure 7-1
Member Agency 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 were established to approximate a cross-section of characteristics unique to the San Diego 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 under Levels 2 through 6 of the Drought Response Matrix (see Section 5.1). For illustration purposes, an estimated 15% cutback in Metropolitan 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 of Directors 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. If 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
Water Authority 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 member agency 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 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). Although GPCD targets set forth in the SWRCBs 2024 regulation are intended to supersede conservation targets in SB X7-7, the compliance targets in SB X7-7 are still active as mentioned in Section 7.1. 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 2015 UWMP contained an aggregated GPCD target of 156 GPCD for year 2020 (excluding agencies that recently detached from the Water Authority's service area, Fallbrook PUD and Rainbow MWD). The growth adjustment calculation is expressed as:

= (Change in Population) X (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 Metropolitan's WSAP, when necessary, in subsequent years of a multi-year allocation period, the growth adjustment amount received from Metropolitan 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 Metropolitan 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 Metropolitan. The same criteria and documentation would be required as discussed above.

Table 7-2 illustrates the growth adjustment calculations for each sample agency.

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

Governing GPCD Target

Agency	Base Period GPCD	Aggregated Agency SB X7-7 Target	Governing GPCD Target
A	176	156	156
B	186	156	156
C	200	156	156
D	151	156	151
E	187	156	156

Growth Adjustment

	Agency A	Agency B	Agency C	Agency D	Agency E
Governing GPCD Target	156	156	156	151	156
Change in Population	103	616	18,473	12,330	718
Gallons (MG)	5.9	35.1	1,051.9	679.6	40.9
Adjustment (AF)	18	108	3,228	2,086	125

GPCD Compliance

As outlined in SB X7-7, retail agencies are required to implement water use efficiency measures that result in a 20% reduction in their per capita water use by the year 2020. Member agencies are required to continue meeting the 2020 targets established in their individual UWMPs. 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 are failing to meet their SB X7-7 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	151	187
SB X7-7 GPCD Target	178	174	210	170	180
Variance	-2	12	-10	-19	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

Local Projects Development

The development of highly reliable in-region supplies, such as potable reuse, brackish groundwater recovery, recycled water, and seawater desalination result in a dual benefit. They add to the San Diego region's supply diversity and are a dependable source during shortages of imported water. An adjustment is made for the regional benefit of these 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 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 Water Authority	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	18	0	20	2,238	0.85%
B	6,500	108	-117	0	6,491	2.44%
C	181,000	3,228	0	1,500	185,728	69.88%
D	43,100	2,086	0	400	45,586	17.15%
E	25,000	125	0	600	25,725	9.68%
				Total	**265,768**	

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 Metropolitan, the Water Authority's IID transfer water, conserved water from planned canal lining programs, and supplies from the Carlsbad Desalination Plant. This excludes the QSA supply component necessary to meet contracted out-of-region exchange demands of 20,000 TAF described in Section 4.1.2. These additional supplies developed by the Water Authority help to reduce demands on Metropolitan and therefore decrease the impact of reductions in Metropolitan's supplies. This is demonstrated in the calculations shown in Table 7-6.

For this example, it is assumed that Metropolitan's allocation results in a drought supply allotment equal to 85% of the Water Authority's M&I demand on Metropolitan. In the example, Water Authority supplies are conservatively set at 20,000 AFY after consideration of out-of-region exchange demands. Actual Water Authority supplies are significantly higher than 20,000 AFY and include supplies from the Carlsbad Desalination Plant and the QSA. Total M&I supply availability is computed by combining Water Authority supplies and Metropolitan 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
Water Authority Supply	20,000
M&I Demand on Metropolitan	253,360
Metropolitan Cutback to M&I Supplies	15%
Net Metropolitan M&I Supply Availability	215,356
Initial Water Authority M&I Supply Availability	235,356
Loss of Local Supply Adjustment Set Aside	4,700
Net Water Authority 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:

= (Net Available Regional Imported Supply) X (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 Water Authority M&I Demands	Water Authority Initial M&I Allocation Volume (AF)
A	0.8%	1,845
B	2.4%	5,536
C	69.9%	161,228
D	17.2%	39,673
E	9.7%	22,374
Total	**100%**	**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 Metropolitan. 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

	Base Period Local Use				
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% Metropolitan Cutback)	**0**	**0**	**3,956**	**0**	**744**

Metropolitan WSAP Alignment

The WSCP allocation methodology also contains adjustments necessary to align it with Metropolitan's WSAP to ensure equitable supply allocations to Water Authority member agencies. In December of 2008, the Board of Directors 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 Metropolitan 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 Metropolitan 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 Metropolitan 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 Metropolitan 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 Metropolitan 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 Metropolitan Board of Directors 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 base 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 than if they had not developed the recycled water supply.

7.2.7 Emergency & Carryover Storage Project

Carryover Storage Adjustment

Under the PSAWR Program, participants are exempt from paying the portion of the Water Authority's storage charge that is tied to carryover storage and therefore, no Emergency & Carryover Storage Project (ECSP) 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 ECSP supplies are delivered solely to M&I customers is outlined below.

Utilizing ECSP Deliveries during Supply Augmentation (Level 1)

In this scenario, the assumptions are that Metropolitan 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 ECSP deliveries. To ensure no ECSP 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 Metropolitan cutback level. The following basic steps will be taken to establish the PSAWR Program allocation of non-ECSP 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 ECSP Supplies during Cutback Levels (Levels 2-6)

At this stage, Metropolitan and the Water Authority are both allocating supplies to their member agencies. The Water Authority is utilizing ECSP supplies to lessen the cutback level from Metropolitan to M&I customers. In establishing member agency allocations, it is critical that the allocations reflect only ECSP deliveries to M&I customers. As a result, a separate calculation to determine the M&I allocation of ECSP deliveries is required. The methodology employed is consistent with the approach used to allocate non-ECSP supplies (i.e., Metropolitan allocation and Water Authority QSA supplies), except that WSAP Alignment Adjustments are not necessary because they pertain to allocation of Metropolitan supplies.

For this sample calculation, it is assumed that the Water Authority is in mandatory cutbacks and 10,000 AF of ECSP storage is made available for distribution to M&I customers. The methodology used to allocate the 10,000 AF of ECSP 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 ECSP supplies.

Table 7-9
ECSP Allocation (AF)

Agency	M&I Base Period Demand	Pro-rata Share of M&I Demand	ECSP Allocation (10,000 AF available storage)
A	2,239	0.8%	80
B	6,498	2.4%	240
C	185,956	69.9%	6,990
D	45,780	17.2%	1,720
E	25,734	9.7%	970
Total	**266,207**	**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 ECSP allocation, as shown in the following equation:

= Supply Allocation + ECSP 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	Water Authority Initial M&I Allocation Volume	Loss of Local Supply Adjustment	Metropolitan WSAP Alignment	ECSP 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 San Diego 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 Metropolitan, 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 the San Diego 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 Water Authority", 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 Water Authority	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 San Diego 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 Metropolitan 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 member agencies up to the minimum level of service. This floor is set at 5% below the San Diego region's total level of service and is triggered when the net cutback to total Water Authority supplies (excluding supplies for out-of-region exchanges) 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 San Diego 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 Metropolitan'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.

Table 7-13
Regional Reliability Floor (AF)
30% Cutback to Metropolitan 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	Water Authority Initial Allocation Volume	Estimated Local Supplies	Loss of Local Supply Adjustment	ECSP 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 Water Authority 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 State Water Project, the Colorado River Aqueduct, Metropolitan'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 Metropolitan 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 Metropolitan's regional shortage is added to the base period local supply. The remainder of the supply is outside of the Metropolitan 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 Metropolitan 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 Metropolitan 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 Metropolitan. 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 San Diego region's needs or eliminates access to imported water supplies. This section describes the Water Authority's Integrated Contingency Plan (ICP), ESP, and Emergency Water Delivery Plans (EWDP), 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 Incident Command System (ICS) 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 Metropolitan in accordance with Standardized Emergency Management System and National Incident Management System guidelines.
- ICS 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 ICS 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 of Directors 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) 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 Metropolitan, 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 2050.

Completion of the Water Authority's Twin Oaks Valley Water Treatment Plant in 2008 increased the ability to treat emergency water supplies delivered from Olivenhain. Prior to construction of the Twin Oaks Valley Water Treatment Plant, 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, completion of the 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

EWDP provides 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 the EWDP and are generally conducted annually as part of the annual storage assessment. 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, and Metropolitan 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, San Luis Rey water transfers and water stored in surface reservoirs. The transfer of local supplies between member agencies can also be considered. Water Authority in-region supplies consist of water produced at the Carlsbad Desalination Plant and water stored in ESP surface reservoirs.

The following general procedure from the EWDP 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, San Luis Rey water transfers and seawater desalination;
- Determine the amount of local water that could be transferred within City of San Diego service areas;
- Determine the amount of 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 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 PSAWR program. The cutback rate for PSAWR 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 PSAWR program; and
- 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, and ESP reservoir supplies.

8.4 Multi-Jurisdictional 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 multi-hazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the multi-hazard mitigation plan addresses seismic risk.

Appendix D includes a copy of the *Multi-Jurisdictional Hazard Mitigation Plan for San Diego County, California*. The *Multi-Jurisdictional Hazard Mitigation Plan* was prepared with input from the Water Authority and under the federal Disaster Mitigation Act of 2000. Section 4.3.4 of the *Multi-Jurisdictional Hazard Mitigation Plan* addresses seismic risk.

Section 9
Communication Plan

9.1 Introduction

The Water Authority and its 22 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 become even more important if supply conditions deteriorate and the Water Authority needs to activate its WSCP. Experience from previous droughts and 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 specific steps they should take to save water
2. How much water they need to conserve 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 and its partners. The diverse needs and characteristics of the Water Authority's member agencies limits the scope of messages and tactics that can be applied to the San Diego 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 San Diego 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 San Diego region. This kind of message is particularly difficult to communicate; residents and businesses have shown willingness to conserve when they are convinced it's important, however, they are reticent if there's no tangible benefit. In fact, calling for conservation when there's plenty of water is counterproductive because it undermines water agencies' credibility. In addition, if residents and businesses are asked to save water for extended periods, their resolve to comply with water-use targets can be eroded by a number of factors ranging from impacts to water rates, negative effects on their lifestyle, equity issues or "drought fatigue."

These possibilities make it 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 of Directors' Legislation and Public Outreach Committee (Board of Directors level). During droughts or other times of limited supply that activate the WSCP, the Water Authority will establish a schedule of more frequent updates, reports and 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 will adjust as needed to reflect evolving water shortage conditions or other factors.

During droughts or other supply shortages, it's also common for entities outside the San Diego region (such as Metropolitan, the Association of California Water Agencies and DWR) to engage in communication activities that extend into the San Diego 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 external resources to complement outreach 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 levels of potential shortage, along with "normal" conditions when no extraordinary water-saving actions are needed. It also includes a "catastrophic" condition when extreme events prompt emergency water-saving measures to preserve supplies for health and safety. The scope of water-saving actions or outcomes vary widely between and within each response level. For example, at Level 2 the communication messages, tactics and resources needed to reach a target of 12% would likely be 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 strategies and tactics will be determined by a number of factors, including WSCP level, member agency needs, specific supply constraints, regulatory circumstances, budget, seasonal conditions, and other factors.

Because of these variables, this communication plan doesn't dictate every strategy and tactic or the scale of resources that need 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 approach is intended to give the Water Authority's Board of Directors and management the flexibility to apply tailored communication 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 each 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 vary by WSCP level, but the key audiences for the communication plan are consistent. In general, they include:

- Member agencies
- Public officials
- Homeowners
- Multi-family property owners/managers
- Commercial-industrial property owners/managers
- Landscape contractors/suppliers
- Business/civic/labor leaders
- High-visibility and high-water-use industries (agriculture, restaurants, hotels, construction, etc.)
- Land-use agencies
- Environmental groups
- Community-based service organizations
- Non-English-speaking populations
- Temporary residents (tourists, college students, etc.)

Circumstances and budgets mean that some 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 reach 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 consistent with voluntary or mandatory actions called for at the relevant level of the WSCP.
- Raise awareness and understanding of the drought, regulations, and/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.
- Coordination with member agencies through JPIC and other groups

- 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 San Diego 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.
- Increase communication with underserved communities using tools such as non-English media and influencers.
- Prepare the San Diego region for escalation (or de-escalation) of the WSCP based on supply conditions.
- Explain how each user class contributes to the larger effort. Enhance communication effectiveness by soliciting and 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 San Diego 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)
- E-newsletters
- Speaker's Bureau presentations
- Print and digital ads
- 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 regional water-use efficiency programs 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, Metropolitan-administered programs and SDG&E-funded programs).

9.7 Level 1 Strategies and Tactics

This section lists 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).

9.7.1 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 status of regional WSCP and recommended water conservation practices
  - Link to sdcwa.org and other relevant website for conservation tips, rebates, tools and other resources
  - Current information on statewide weather, water supply and/or regulatory conditions
  - Information on how the Water Authority and its member agencies are successfully enhancing the San Diego 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 San Diego region about the importance of achieving voluntary water conservation and encourage them to publicly promote such efforts to their constituents.

9.7.2 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 of Directors 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/release or other events 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
    - Ensure non-English media and audiences have access to materials
  - Website messaging (sdcwa.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
  - Use website pop-ups on sdcwa.org for call to action. 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)
  - Underserved community 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 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, Metropolitan, DWR/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.

9.8.1 Recommended Strategies

- Engage member agencies in the development of more serious campaign messages that reflect 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 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 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, including non-English-speaking 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 San Diego region's 22 member agencies, Metropolitan, DWR, 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.

9.8.2 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/release 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 sdcwa.org
  - E-newsletter
    - Ensure drought updates or conservation information are distributed at least twice monthly through WaterSource e-newsletter.
    - Deploy subject-specific newsletter as needed.
  - 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

    - Consider creating a smartphone app that allows residents to report incidents of water waste directly to member agencies.
    - Consider button on sdcwa.org website for water-waste reporting.

- 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 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.
  - Establish partnership with 211 to provide resources and information

- Community Partnerships
  - Consider adding funds to attract more high-value community partnerships
  - Develop collaborations with community health clinics like San Ysidro Health and Family Health Centers to convey critical information.

- Government Relations
  - Provide in-person briefings to state and local officials on water supplies and 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 other water agencies to maximize reach (City of San Diego, Metropolitan, DWR/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.

9.9.1 Recommended Strategies

- Engage member agencies in the development of a more serious campaign message that reflects the need for extraordinary conservation. Provide visuals and other supporting materials for the campaign to member agencies.
- Distribute 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.

9.9.2 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/release or other event to announce/explain any change in WSCP level
  - Invite local elected officials to participate to convey need for savings across the San Diego 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.).
  - Add pop-up about water supplies/conservation to website.
- 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 tactics/messages 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.

9.10.1 Recommended Strategies

- Engage member agencies in the development of campaign messages and tactics that raise awareness of the extreme shortage conditions facing the San Diego 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.
- Emphasize the need for all residents and businesses to work together to help the San Diego 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, including the County EOC.

9.10.2 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/release 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.
  - Add pop-up about water supplies/conservation to website.

- 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.

9.11.1 Recommended Strategies

- Engage member agencies in the development of campaign messages and tactics that raise awareness of the emergency conditions facing the San Diego 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 San Diego 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, including the County EOC

9.11.2 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 sdcwa.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%**	**Level 2** **Up to 20%**	**Levels 3-4** **Up to 30% or 40%**	**Levels 5-6** **Up to 50% or >50%**
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 of Directors 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 of Directors 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.

Section 10
Implementation

The WSCP contains actions the Water Authority will take to analyze and respond to shortage conditions. Board of Directors-approved policies and procedures are critical to ensure successful implementation of the WSCP. The Board of Directors' 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 of Directors' 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 2026, the Water Authority Board of Directors approved the WSCP with Resolution No. 2026- (Appendix E) to establish the policies and procedures to administer the M&I water supply allocation methodology. The methodology is contained in Section 7. The WSCP addresses 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 of Directors 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 Metropolitan on the Water Authority for exceeding its annual allocation; and
- Provide monthly reports to the MAAT and the Water Authority Board of Directors on water use compared to allocations for each member agency, once mandatory cutbacks are required.

10.1.1 Municipal and Industrial Water Supply Allocations

The following provisions govern the establishment and adoption of a water supply allocation whenever the Board of Directors 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 of Directors. If the shortage of supply is related to cutbacks by Metropolitan, it is the intention of the Board of Directors that the Water Authority's allocation period be consistent, to the extent

feasible, with Metropolitan's 2014 WSAP, or later update of such plan, adopted by Metropolitan.

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 EWDP 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 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 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 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.

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 of Directors. All other modification requests are considered minor and may be approved by the General Manager after consultation with the MAAT.

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 Metropolitan. Supply allocations to PSAWR customers shall be established, monitored, and enforced based on Metropolitan's WSAP M&I water supply reduction guidelines and the Water Authority's PSAWR guidelines. If the PSAWR Program is terminated, the Board of Directors 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 of Directors, staff prepares monthly updates to the Board of Directors and MAAT on state and local water supply conditions. The updates include information on State Water Project 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 Drought 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 Drought Response 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 of Directors. 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 of Directors 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. The Board of Directors updated the RSF policy in 2006, 2019, and January 2026 to align the fund with evolving hydrologic conditions and financial objectives.

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. The structure of the Water Authority's rates and charges have been updated numerous times to reflect changes in service, water demands, and to increase financial resilience. Notably, 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. Later, in March 2015, the Board of Directors adopted the new fixed Supply Reliability Charge. The Supply Reliability Charge recovers a portion of the 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. Additionally, in July 2024, the Board of Directors adopted a new Transportation Fixed charge to collect a portion of transportation expenses on a fixed basis, lessening the financial volatility and impacts of uncertain water sales.

Although the Water Authority maintains various 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 as necessary.

Appendix A

Carryover Storage Policy Guidelines

San Diego County Water Authority
Policy Guidelines for Managing Carryover Storage Supplies
Updated April 24, 2025

Water Authority carryover storage capacity includes 100,000 acre-feet (AF) of in-region surface storage at San Vicente Reservoir and also an out-of-region groundwater banking program at 70,000 acre-feet (AF) capacity in the Central Valley. Through these efforts, the Water Authority can store water available during wet periods for use during dry-year shortages to minimize or avoid cutbacks to its member agencies.

The following proposed guidelines provide policy direction to staff 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 its member agencies during drought.

A. 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**
   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 Metropolitan, reduction in Colorado River transfers or decrease in deliveries from the Claude "Bud" Lewis 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 Urban Water Management Plan (UWMP) is that carryover storage be withdrawn over a three-year period in equal increments. As stated in the Department of Water Resources (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 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. 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 Permanent Special Agricultural Water Rate (PSAWR) Program customers.**

   In September 2020, the Water Authority Board adopted ordinance No. 2020-04 to establish the PSAWR Program effective January 1, 2021. Under the PSAWR Program policies and guidelines, deliveries to member agencies are exempt from the Storage Charge and Supply Reliability Charge. In exchange for the cost benefit associated with exemption from the Storage Charge, customers receiving the PSAWR Program rate forfeit some, and potentially all, of certain designated Water Authority's storage supplies.

For example, if Emergency Storage Project (ESP) supplies are utilized, the cutback rate for customers receiving the Water Authority's agricultural water rate would be twice the rate imposed on Water Authority member agency M&I customers, up to a 90% cutback. Reductions in deliveries that arise from such a cutback would be reallocated to M&I customers. Additionally, no Water Authority Carryover Storage Program (CSP) supplies are available to member agency customers receiving the PSAWR Program rate. The latest version of the Water Authority's Water Shortage Contingency Plan (WSCP), approved by the Water Authority Board in May 2021, includes a methodology for allocating CSP supplies only to M&I customers.

B. 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 would be conducted once a year by May when hydrologic conditions are more certain. An information report would be provided to the Board with the results of the analysis.
   - More frequently, if conditions warrant the evaluation.

7. **Maintain a target volume of 40,000 AF with a 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 40,000AF target is based on a range of potential water supply and demand scenarios modeled as part of the 2024 Water Facilities Master Plan.

Appendix B

Model Drought Ordinance

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 22 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 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 increasingly restrictive in order to attain escalating conservation goals.

(d) During a Drought Response Level 2 condition or higher, violations of the water conservation measures and water use restrictions established by this ordinance 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	Conservation Target
1	Up to 10%
2	Up to 20%
3	Up to 30%
4	Up to 40%
5	Up to 50%
6	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].

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 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 increase public awareness of the following water conservation practices. [The same water conservation practices become more severe if [AGENCY] declares a Level 2 Drought Alert condition]:

1. 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.

2. Stop landscape irrigation between 10 am and 6pm. Public and private golf course greens 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 also exempt. 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. Do not water landscapes using potable water during and within 48 hours after measurable rainfall.

3. Do not irrigate landscapes in excess of the number of watering days assigned by the [AGENCY]. Irrigation to establish new landscapes is allowed to exceed the number of watering days 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.

4. 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.

5. Do not use potable water for fountains or other decorative water features, except where the water is part of a recirculating system or to the extent needed for maintenance.

6. Do not irrigate ornamental turf on public street medians with potable water.

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. Do not overfill swimming pools. Do not drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards.

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. 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. 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.

3. 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.

4. 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.

5. Turf over-seeding is prohibited.

6. Repair all leaks within seventy two (72) hours of notification by the [AGENCY] unless other arrangements are made with the General Manager.

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 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. Do not power wash exterior surfaces such as buildings and siding, or impervious surfaces including, but not limited to, sidewalks, driveways, parking lots, tennis courts, or patios. Power washing to alleviate safety or sanitation hazards is exempt.

4. Do not fill or refill 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.

5. 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 conservation measures:

1. Do not irrigate landscapes more than once per week during the months of November through May. The use of irrigation to establish new landscapes is not allowed to exceed the number of watering days no matter the building conditions. Commercial growers and nurseries are exempt.
2. Stop washing vehicles, except at commercial facilities that recirculate (reuse) the water.
3. Do not fill pools. Pools and spas must be covered during non-use.

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 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

3. Draining swimming pools, except as necessary to complete structural repairs or to comply with public health standards, is prohibited..

(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 NOTICATION 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 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 HARDSHIP 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. 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.

(e) 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.

(f) 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

A List of Additional, Extraordinary, and Permanent Retail Customer Water Use Prohibitions

A List of Additional, Extraordinary, and Permanent Retail 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 additional, extraordinary, and permanent prohibitions, and residential and non-residential categories. The example retail customer water use prohibitions outlined below that are deemed "additional" and "extraordinary" are those measures that reduce retail water customers' demand more than ongoing water use efficiency activities.

Additional Customer Water Use Prohibitions:

The additional demand reduction measures included in this list may be implemented when the regional water shortage level reaches Levels 2 through 3 of the Drought Response Matrix included in Section 5.1 of the WSCP.

Residential:

Landscape:

- 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 weekly irrigation of landscapes in excess of the number of watering days assigned by the water supplier is prohibited.
- Over-seeding of turf is prohibited.

Power Washing:

- Power washing of exterior surfaces, including buildings and 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.

Leak Detection and Repair:

- Repair all leaks within 48 to 72 hours of notification by the water supplier unless other arrangements are made with the water supplier.

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.

Non-Residential:

Landscape:

- 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 weekly irrigation of landscapes in excess of the number of watering days assigned by the water supplier is prohibited.
- Over-seeding of turf is prohibited for any commercial, institutional, or industrial property.

Power Washing:

- Power washing of exterior surfaces, including buildings and 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.

Leak Detection and Repair:

- Repair all leaks within 48-72 hours of notification by the water supplier unless other arrangements are made with the water supplier.

Water Service:

- Suspend consideration of annexations into water agency service areas.

Extraordinary Customer Water Use Prohibitions:

The extraordinary demand reductions measures included in this list may be implemented, during Levels 4 through 6 of the Drought Response Matrix included in Section 5.1 of the WSCP.

Residential:

Landscape:

- The use of irrigation to establish new landscapes is not allowed to exceed the number of watering days no matter the building conditions.
- The irrigation of landscapes more than once per week during the months of November through May is prohibited.
- Irrigation is not allowed at any time even if 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).

- All landscape irrigation is prohibited, with the following exceptions:
  - 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 that is 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 livestock.

Vehicle Washing:

- Washing vehicles is prohibited, except at commercial facilities that recirculate (reuse) the water.

Fountains/Decorative Water Features:

- The use of potable water in a fountain or other decorative water features, even if it has a recirculating system, is prohibited.

Leak Detection and 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.

Swimming Pools/Ponds:

- Pool filling is prohibited.
- Draining swimming pools, except as necessary to complete structural repairs or to comply with public health standards, is prohibited.
- Pools and spas must be covered during non-use.

Non-Residential:

Landscape:

- 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.
- All landscape irrigation is prohibited, with the following exceptions:
  - 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 livestock.

Swimming Pools/Ponds:

- Pool filling is prohibited.
- Draining swimming pools, except as necessary to complete structural repairs or to comply with public health standards, is prohibited
- Pools and spas must be covered during non-use.

Vehicle Washing:

- Washing vehicles is prohibited, except at commercial facilities that recirculate (reuse) the water.

Cooling Systems:

- Lack of cooling system monitoring, through submeter or other monitoring device, is prohibited.

Leak Detection and 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.

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.

Permanent Customer Water Use Prohibitions:

The permanent water use prohibitions included in this list should be implemented at all times.

Residential:

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 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.
- The weekly irrigation of landscapes in excess of the number of watering days assigned by the water supplier is prohibited.
- The use of irrigation to establish new landscapes is allowed to exceed the number of watering days 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).
- 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.

Power Washing:

- Power washing of exterior surfaces that causes water waste or water runoff, 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.

Fountains/Decorative Water Features:

- The use of potable water in a fountain or other decorative water features that do not have a recirculating system, is prohibited.

Swimming Pools/Ponds:

- Customers shall not overfill swimming pools and spas.
- 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.

Non-Residential:

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.

- Water waste resulting from inefficient landscape irrigation, such as runoff, low head drainage, or overspray, etc. is prohibited. Similarly, stop water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures.
- Irrigation of commercial, industrial or institutional landscapes is prohibited between 10 a.m. and 6 p.m. Public and private golf course greens 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.
- Irrigation with potable water of ornamental turf on public street medians is prohibited.
- The irrigation with potable water of landscapes outside of newly constructed commercial, institutional and industrial 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.
- 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.
- 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).
- 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.

<u>Power Washing:</u>

- Power washing of exterior surfaces that causes water waste or water runoff, is prohibited.

<u>Swimming Pools/Ponds:</u>

- 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.
- 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:

- Serve and refill water in restaurants, bars, and other food service establishments only upon request.
- Offer guests in hotels, motels, and other commercial lodging establishments the option of not laundering towels and linens daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

Construction:

- Recycled or non-potable water must be used for construction purposes when available and economically feasible.
- The use of unnecessary water for construction purposes is prohibited.

Appendix D

Multi-Jurisdictional Hazard Mitigation Plan



Multi-Jurisdictional Hazard Mitigation Plan

San Diego County, California

2023

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INTRODUCTION

PLAN DESCRIPTION

Across the United States, natural and human-caused disasters lead 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 situations.

With experience in presidential disaster declarations, gubernatorial proclamations, and local emergency proclamations, San Diego County, California recognizes the consequences of disasters, the need to reduce impacts of natural and human-caused hazards, and the importance of increasing regional resiliency.

Elected and appointed County officials also know that carefully selected mitigation actions (in the forms of projects and programs) can become long-term, cost-effective means for reducing natural and human-caused hazard impacts.

This *San Diego County, California, Multi-Jurisdictional Hazard Mitigation Plan* (The/This Plan) was prepared with input from:

- County public
- County of San Diego Groups, Agencies and Departments
- Eighteen Incorporated Cities
- The Port of San Diego
- Water Districts
- Fire Protection Districts
- Air Pollution Control District
- The National Weather Service
- Scripps Institution of Oceanography, University of California San Diego
- California Office of Emergency Services (Cal OES)
- Federal Emergency Management Agency (FEMA).

This plan update included over three years of coordination with planning participants and will help guide the region toward greater disaster resilience in harmony with the community layout and needs.

PLAN PURPOSE

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 most current legislation to improve this planning process (Public Law 106-390). The 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 requirements for the national post-disaster Hazard Mitigation Grant Program (HMGP).

Section 322 of DMA 2000 specifically addresses mitigation planning at 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 Hazard Mitigation Plans must demonstrate their proposed mitigation measures are based on a sound planning process that account for the risk to and the capabilities of the individual communities.

State governments have certain responsibilities for implementing Section 322, including:

- 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
- 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 and collaboration between state and local authorities, which encourages and rewards local and state pre-disaster planning and promotes sustainability as disaster resilience strategy. 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.

This plan was prepared to meet state and federal statutes and 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.

EXISTING AUTHORITIES

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 (USDCESO) and the Unified Disaster Council (UDC) as the policy making group. This Plan is intended to serve many purposes, including:

- *Enhance Public Awareness and Understanding*– to help the public better understand the natural and human-caused 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 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 to document each jurisdiction's ability to expand on and improve existing policies and programs.
- *Provide Inter-Jurisdictional Coordination of Mitigation-Related Programming* – to ensure 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 State Hazard Mitigation Plans are updated every three years and local plans, including this San Diego County Plan, every five years. This means San Diego's Multi-Jurisdictional Hazard Mitigation Plan uses a five-year planning cycle, which is designed to coordinate the region's edits of data, assumptions, goals, objectives, and actions/projects before the plan is submitted for re-approval to Cal OES and FEMA.

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 (according to their existing authorities) once the State of California and FEMA have granted provisional plan approval in the form of an "Approved Pending Adoption" Letter.

SECTION ONE: Determining the Planning Area and Resources



Decorative Image

CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

1. SECTION ONE: DETERMINE THE PLANNING AREA AND RESOURCES

Overall, San Diego County is comprised of 18 incorporated cities and a vast number of unincorporated communities. The county's total population in 2020 was approximately 3.3 million—making San Diego County the second most populous county in the state.[1]

1.1. PLANNING AREA: SAN DIEGO COUNTY

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.[2] Elevation ranges from sea level to about 6,500 feet. Orange and Riverside Counties border the north, the agricultural communities of Imperial County border the east, the Pacific Ocean lies west, and the State of Baja California, Mexico borders the south.

1.1.1. UNINCORPORATED COMMUNITIES (POPULATION: 505,675)[3]

The Unincorporated County consists of approximately 34 Community Planning and Sub-regional Areas. Many of the communities in the Unincorporated County jurisdiction are 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 in the central mountains, along a principal 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.

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.

The following subsections provide County of San Diego *Economy, Physical Features, Infrastructure,* and *Jurisdictional* summaries, with data and research provided within the

[1] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[2] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[3] 2020 Jurisdiction Population Estimate from SANDAG: https://datasurfer.sandag.org/dataoverview

County of San Diego's existing *"Adopted Operational Plan Fiscal Years 2021-2022 and 2022-2023"*:

1.1.2. ECONOMY

San Diego offers a vibrant and diverse economy, along with a strong and committed partnership of local government and businesses dedicated to the creation and retention of quality jobs. The San Diego County 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.

Gross Domestic Product (GDP) can be an indicator of the nation's economic health, and its growth is driven by multiple sectors, including net exports of goods and services, government consumption expenditures, and gross investment. According to the U.S. Bureau of Economic Analysis (BEA), calendar year 2020 saw a decrease in real GDP, as the national economy was impacted by the response to the global COVID-19 pandemic.

The economic impacts of the COVID-19 pandemic prompted federal fiscal stimulus efforts, which provided support to economic activity in 2020 and potentially in 2021 (COVID-19 pandemic economic impacts are regularly assessed). As the State of California economically recovers from the COVID-19 pandemic, experts predict consumers will resume pre-pandemic behaviors like spending money on clothing, cars, housing, and furniture. In 2019, San Diego County accounted for more than $222.3 billion (7.9%) of California's GDP and 8.4 percent of the State's population (based on U.S. Census data).

San Diego's abundant and diverse supply of labor at competitive rates is one of the area's greatest assets. A 2019 study using 2019 data found that 23% of San Diego County's workforce is either in the retail or hospitality sectors. San Diego County also includes the largest concentration of U.S. military in the world, which is an important contributor to the region's economy.[4]

1.1.3. EMPLOYMENT

According to the California Employment Development Department, low and middle San Diego County wage workers made more than the state average, however, high wage earners made less than the state average. In 2019, the median household income for San Diego County was nearly $79,000, but other factors, like inflation, could have reduced spending availability.[5]

The COVID-19 pandemic also affected jobs that relied on tourism. A study using 2019 data found that 23% of San Diego County's workforce were employed in the retail or leisure & hospitality sectors. Therefore, unemployment numbers increased during the COVID-19 Pandemic.[6]

Unemployment rates rose to 15.9% by the end of April 2020, dropped to 6.8% by November 2020, and fell again to 6.3% by May 2021. This unemployment rate was slightly higher than

[4] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[5] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[6] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

the national average of 5.5%, but also significantly lower than the state's rate of 7.5%.[7] [8] Overall, the region's job and unemployment numbers are improving, and labor supply is still strong.

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.[9]

1.1.4. 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 mild winters, pleasant summers, and an abundance of sunshine and light rainfall. [10] 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 70 degrees and lows are about 55 degrees. [11] The local mountains also get a light snowfall several times a year. East of the mountains is the Anza Borrego Desert—where rainfall is minimal, and summers are hot.

The dry, mild climate of San Diego County is conducive to productivity. Outdoor work and recreational activities are possible almost year-round. In addition, storage and indoor work can be handled with minimum investment in heating and air conditioning, although extreme heat events have recently increased in both frequency and severity.

1.1.5. INFRASTRUCTURE

According to FEMA's *Local Mitigation Planning Handbook*, infrastructure systems are critical for life safety and economic viability, and include transportation, power, and water systems. Many critical facilities depend on infrastructure to function. For example, hospitals need electricity and water to continue treating patients. As with critical facilities, the continued operations of infrastructure systems during and after a disaster are key factors in the severity of regional impacts and the speed of recovery.[12]

[7] https://www.bea.gov/data/gdp/gdp-county-metro-and-other-areas

[8] https://www.labormarketinfo.edd.ca.gov/

[9] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[10] https://usafacts.org/issues/climate/state/california/county/san-diego-county?endDate=2022-06-06&startDate=2018-02-01#climate

[11] https://www.weather.gov/wrh/climate?wfo=sgx

[12] https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

TRANSPORTATION

San Diego has a well-developed road system. There are freeways and state highways maintained by Caltrans, private roads maintained by property owners, and other public roads like those within incorporated cities (not within the *County Maintained System*). [13]

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).

The Metropolitan Transit System (MTS) operates transit service under MTDB and owns assets of San Diego Trolley, Inc. (SDTI), San Diego Transit Corporation (SDTC), and the San Diego & Arizona Eastern (SD&AE) Railway Company (which owns 108 miles of track and right-of-way). Pre-COVID-19 Pandemic, MTS served approximately 3 million people in San Diego County, generated 88 million annual passenger trips (300,000 trips each workday), and responded to demand by scheduling 7,000 trips each workday. MTS licenses and regulates taxicabs, jitneys, and other private for-hire passenger transportation services by contract with the cities of San Diego, Chula Vista, El Cajon, Imperial Beach, La Mesa, Lemon Grove, National City, Poway, Santee, and portions of San Diego County's unincorporated areas. Routes also connect with other regional operators' routes, and San Diego Trolley operates the light rail transit system under MTDB. [14]

Alternatively, the North County Transit District (NCTD) is governed by Board of Directors with voting members from Carlsbad, Del Mar, Encinitas, Escondido, Oceanside, Solana Beach, San Marcos, Vista, and San Diego County, and one non-voting member from the City of San Diego. NCTD operates within a geographical area of approximately 1,020 square miles, and primarily carries passengers in North San Diego County (from the Pacific Ocean east to Ramona, and from the Orange County border south to Del Mar, with connections extending to downtown San Diego). NCTD provides about 10.3 million passenger trips per year, and its bus system has 30 routes.

In addition, NCTD runs special Express Buses for certain sporting and special events in San Diego. Other services include SPRINTER hybrid rail, COASTER commuter trains, FLEX demand response, and LIFT ADA paratransit service. NCTD shares the use of its tracks with rail partners: Amtrak, Metrolink, BNSF, and Pacific Sun Railroad. Amtrak and Metrolink operate more than 264 commuter trains on our tracks every week, while BNSF and Pacific Sun move more than 9.6 million pounds of freight. [15] [16]

GAS & ELECTRICITY (POWER)

San Diego Gas & Electric (SDG&E) is a public utility company that provides natural gas and electric service to 3.7 million consumers through 1.4 million electric meters and 873,000 natural gas meters in San Diego County and South Orange County. [17] Overall, SDG&E's service area encompasses 4,100 square miles, two counties, and 25 communities. SDG&E is a subsidiary of Sempra Energy, a Fortune 500 energy services holding company based in

[13] https://www.sandiegocounty.gov/content/sdc/dpw/roads/maintroad.html

[14] https://www.sdmts.com/about/about-mts

[15] NCTD-At-A-Glance-Fact-Sheet-February-2022.pdf (gonctd.com)

[16] Facts Sheets | North County Transit District (gonctd.com)

[17] About Us | San Diego Gas & Electric (sdge.com)

San Diego. All petroleum products in the region are delivered via a pipeline system operated by Kinder Morgan Energy Partners. [18] [19]

WATER

The San Diego County Water Authority (Water Authority) is a public agency serving the San Diego region as a wholesale supplier of water. Water Authority works through its 24 member agencies to provide a safe, reliable water supply to support the region's $240 billion economy and the quality of life of 3.3 million public members. [20] The 24 member agencies are comprised of six cities, three public utility districts, three irrigation districts, eleven municipal water districts, and one federal agency (military base) and cover a service area of 934,778 acres. [21]

In 2020, Metropolitan Water District of Southern California supplied 18% of San Diego County Water Authority's water, while 82% came from local and other supplies. Metropolitan Water District imports the water from two sources: the Colorado River and the *State Water Project* (Bay-Delta) in Northern California. [22] [23] Traveling hundreds of miles over aqueduct systems (including pump stations, treatment plants and reservoirs), water is transported through the Water Authority's five primary pipelines, then distributed to the member agencies for delivery to the public.

In 2020, 127 gallons of water per person, per day, were used in San Diego County. [24]

1.1.6. PLANNING AREA: LOCAL JURISDICTIONS

The planning area for this document also includes local jurisdictions, such as the eighteen incorporated cities and special districts. More details are provided in participating jurisdictions' respective annexes.

Carlsbad (Population: 114,746)

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). Carlsbad's commercial/recreational landscape also includes Legoland, which opened in spring 1999.

The City of Carlsbad has a strong economy, much of which has come from industrial development. For example, Callaway Golf, Cobra Golf, Ionis Pharmaceuticals, and Immune Response are a few of the local companies located in Carlsbad. [25] [26]

[18] https://www.sdge.com/more-information/our-company

[19] https://www.sdge.com/more-information/our-company/about-us#:~:text=3.7%20million%20consumers,Diego%20and%20southern%20Orange%20counties.

[20] https://www.sdcwa.org/about-us/

[21] https://www.sdcwa.org/wp-content/uploads/2020/11/overview-fs.pdf

[22] https://www.mwdh2o.com/media/12208/2022-annual-achievement-report-full.pdf

[23] https://www.sdcwa.org/wp-content/uploads/2020/11/overview-fs.pdf

[24] Ibid

[25] https://ir.ionispharma.com/news-releases/news-release-details/isis-pharmaceuticals-changes-name-ionis-pharmaceuticals

[26] https://ir.callawaygolf.com/corporate-governance/contact-the-board

The City of Carlsbad has four high performing school districts (Carlsbad Unified, Encinitas Union, San Dieguito Union & San Marcos Unified). Distinguished private and parochial schools also serve Carlsbad (including the internationally renowned Army & Navy Academy), which offer specialties in STEM/STEAM, the arts, International Baccalaureate, and other curricula.[27] [28]

Chula Vista (Population: 275,487)

The City of Chula Vista is located at the center of one of the richest cultural, economic, and environmentally diverse zones in the United States. It is the second-largest city in San Diego County and boasts more than 52 square miles of coastal landscape, canyons, rolling hills, mountains, quality parks, and trails. Chula Vista is a leader in conservation and renewable energy and has outstanding public schools.

Established neighborhoods, contemporary communities, start-up firms, corporations, nationally recognized entertainment venues, the nation's only warm weather athlete training center (the Chula Vista Elite Athlete Training Center), an award-winning nature center, and a historic downtown all contribute to Chula Vista's attraction for both families and businesses.[29]

A range of educational opportunities, from preschool to college are available in Chula Vista. Chula Vista Elementary School District (CVESD) is the largest K-6 district in California with over 28,500 students and 46 campuses. The CVESD is a high-performing and frequently honored district for student academic achievement, The city is also home to the Sweetwater Union High School District (SUHSD), the largest secondary school 7-12 district in California. The district encompasses 41,000 students, and 24,000 adult students on 32 campuses.[30]

Coronado (Population: 20,192)

The City of Coronado is a small, 13.5 square mile beach community, with an island feel. The military bases of the Naval Air Station North Island and Naval Amphibious Base occupy 5.3 square miles, and 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).[31]

It is primarily a bedroom community for San Diego 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 the lush surroundings and village appeal of Coronado. The city contains world-class resorts, including the Hotel Del Coronado, and highly acclaimed restaurants.

Coronado Unified School District serves local students and includes eight schools.[32]

Del Mar (Population: 4,268)

Incorporated in 1959, the City of Del Mar is a quaint, seaside village located 20 miles north of San Diego. Del Mar is the smallest city in the County, covers just 2.2 square miles, and is known for its vibrant small-town atmosphere. Del Mar attracts locals and upwards of 2 million

[27] https://www.carlsbadca.gov/residents/schools

[28] https://www.armyandnavyacademy.org/

[29] https://trainatchulavista.com/about-olympic-athlete-training-site/

[30] chulavistaca.gov/residents/education

[31] https://www.coronado.ca.us/210/About-Coronado

[32] https://coronadousd.net/Our-District/index.html

visitors annually from all over the world, who come to enjoy the beautiful dog-friendly beaches, hiking trails, scenic views, and the many shops and dining opportunities located within the Del Mar Village.

The community is primarily comprised of single-family residential neighborhoods, with retail uses and restaurants in the downtown, a small commercial area, and several hotels. 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's shoreline includes the Del Mar City Beach and the Torrey Pines State Beach.

The city provides law enforcement services through a contract with the San Diego County Sheriff's Department, and fire administration is provided through a mutual agreement between the cities of Del Mar, Encinitas, and Solana Beach. [33]

El Cajon (Population: 106,215)

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. 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. There are three School Districts that serve El Cajon: Cajon Valley Unified School District, La Mesa-Spring Valley Unified School District, and Grossmont Union High School District. There are also several charter schools within the city. [34]

Encinitas (Population: 62,780)

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. Encinitas is bordered by Carlsbad to the north, Solana Beach to the south and the community of Rancho Santa Fe to the east.

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. The San Elijo Lagoon Reserve boasts the largest coastal wetland in San Diego County and is home to nearly 300 different bird species throughout the year. The century-old Downtown 101 coastal shopping district features historic architecture, quaint shops, sidewalk cafes, specialty retail stores and upscale restaurants.

The city is served by the Encinitas Union School and San Dieguito Union High School Districts. [35]

[33] https://www.delmar.ca.us/764/About-Del-Mar

[34] https://www.elcajon.gov/resident-services/living-in-el-cajon/el-cajon-schools

[35] https://coronavirus.encinitasca.gov/public-schools

Escondido (Population: 151,038)

Escondido is located 30 miles north of San Diego and is approximately 18 miles inland from the coast. In 1994, the people of Escondido conceived a vision of cultural excellence.[36] Today, the $73.4 million California Center for the Arts stands as a product of this vision. Inland North San Diego County, of which Escondido is at the core, is emerging as a regional economic leader at the forefront of job development and new industries. Escondido has a comprehensive mix of successful businesses—supplying a diverse job base and high quality of life.[37]

There is a unique mix of agriculture, industrial firms, high-tech firms, recreational centers, parks, and residential areas in the city. The area's largest shopping mall, the North County Fair, houses major retail and smaller stores. California State University, San Marcos and Palomar Community College are located within minutes of Escondido.

Escondido is served by two public school districts—Escondido Union and San Pasqual Union.[38]

Imperial Beach (Population: 26,137)

Imperial Beach claims the distinction of being the "Most Southwesterly City – in the continental United States." The city is 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 26,137, Imperial Beach occupies an area of 4.4 square miles. Imperial Beach offers some of the least expensive housing west of Interstate 5. It is primarily a resort/recreation community with a vast beach area, as well as a 12,000-foot pier for fishing. Looking south, just across from the international border, Tijuana's famous "Bullring by the Sea," the Plaza De Monumental can be seen.

The city is served by two school districts—South Bay Union and Sweetwater Union.[39]

La Mesa (Population: 61,121)

La Mesa is centrally located 12 miles east of Downtown San Diego, and is a suburban residential community as well as a commercial and trade center. The area is characterized by rolling hills and has many 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 Mount Helix. La Mesa has an abundance of mixed-use condominiums for those who prefer a downtown village atmosphere. There is 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 in the heart of the city and adjacent to another major activity center—Grossmont Hospital.

The La Mesa-Spring Valley Elementary School District provides elementary and 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.[40]

[36] https://artcenter.org/about/history/

[37] https://escondido.org/employment-in-escondido

[38] https://escondido.org/escondido-schools

[39] https://www.imperialbeachca.gov/community

[40] https://www.guhsd.net/

Lemon Grove (Population: 27,627)

Lemon Grove lies about nine miles east of Downtown San Diego and has the charm of small-town living with the conveniences of big city proximity. Initially the site of expansive lemon orchards, the city remains a small town with a rural ambiance.[41]

The Sheriff's Department Lemon Grove Substation has provided contract law enforcement services to the City of Lemon Grove and unincorporated communities of Spring Valley, Rancho San Diego, Jamul, Mt. Helix, Casa De Oro, La Mesa, and El Cajon since 1977.[42]

The city is also served by two school districts—Lemon Grove School and Grossmont Union High School Districts, which include six elementary schools, one middle school, and three high schools.[43]

National City (Population: 56,173)

Incorporated in 1887, National City is one of the county's oldest incorporated areas. Just five miles south of the City of San Diego, National City is the South Bay's center of industrial activity and has a rich history. The city embodies a proud tradition of commerce, urban agriculture, production, and transportation.[44]

There are a great number of historical 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 there. Additionally, the San Diego Naval Station overlaps both Cities of San Diego and National City and is the largest naval facility in the country.

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 also located in National City.

Oceanside (Population: 174,068)

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 Pacific Ocean to the west. The current population of makes Oceanside the largest coastal community.

Industrial real estate rates tend to be lower than the county average, and housing tends 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, Oceanside Harbor, and Oceanside Lagoon.[45]

[41] https://www.lemongrove.ca.gov/community

[42] https://www.lemongrove.ca.gov/city-hall/law-enforcement

[43] https://www.lemongrove.ca.gov/community/local-schools

[44] https://www.nationalcityca.gov/government/city-manager/economic-development

[45] https://visitoceanside.org/

The city is served by the Oceanside Unified School District with 15 elementary, six middle, and three high school options. [46]

Port of San Diego

The Port was established in 1962 under the Port Act and is charged with implementing the Tidelands Trust Doctrine. [47] [48] The Port of San Diego manages San Diego Bay and 34 miles of its natural waterfront for the people of California.

For over 50 years, the Port's five member cities (Chula Vista, Coronado, Imperial Beach, National City, and San Diego) have worked together to develop and promote commerce, navigation, recreation, and fisheries on and around San Diego Bay.

Self-funded, The Port contributes billions annually to San Diego's economy, benefiting the community, local businesses, and employees. Businesses at The Port provide thousands of well-paying jobs, supporting individuals and families throughout the region. The Port is governed by a seven-member Board of Port Commissioners representing five cities and provides leadership that transcends local boundaries. The Port's daily operations are carried out by a workforce of over 550 dedicated employees. [49]

The Port of San Diego is the fourth largest of the eleven ports in California, and it has invested hundreds of millions of dollars in public improvements within its five member cities.

The Port oversees two maritime cargo terminals, two cruise ship terminals, 22 public parks, the Harbor Police Department, and the leases of hundreds of tenant and subtenant businesses around San Diego Bay. These include 17 hotels, 74 restaurants, three specialty retail centers and numerous other attractions including museums and bay tours. [50]

Each year, millions of people enjoy a remarkable way of life offered by San Diego Bay and its waterfront communities. [51]

Poway (Population: 48,841)

Poway is located 23 miles northeast of the City 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. This 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 Center for the Performing Arts is an 809-seat professional theater that also provides local entertainment. [52]

The Poway Unified School District (PUSD) is excellent and has consistently been rated as top tier. PUSD operates 25 elementary schools (K-5), one elementary & middle school combination (TK-8th), six middle schools (6-8), one continuation high school, five

[46] https://www.oside.us/

[47] https://pantheonstorage.blob.core.windows.net/administration/San-Diego-Unified-Port-District-Act.pdf

[48] https://pantheonstorage.blob.core.windows.net/administration/California-Public-Trust-Doctrine.pdf

[49] https://www.portofsandiego.org/people

[50] https://www.portofsandiego.org/about-port-san-diego/history

[51] https://www.portofsandiego.org/about-port-san-diego

[52] https://www.powaycenter.com/156/Technical-Information

comprehensive high schools (9-12), and one adult school. Twenty-six schools are in the City of San Diego and twelve schools are in Poway. The district serves over 36,000 students and is the third largest school district in the county.[53]

San Diego (Population: 1,386,932)

The City of San Diego is the largest city in San Diego County and is the second largest city in the state. San Diego is renowned for its idyllic climate, 70 miles of pristine beaches and a dazzling array of world-class family attractions. Popular attractions include the world-famous San Diego Zoo, San Diego Zoo Safari Park, SeaWorld San Diego, LEGOLAND California, Cabrillo National Monument, and Old Town State Historic Park.

San Diego's arts and culture and culinary arts are also booming. New culinary arts talents prepare award-winning meals throughout the region's 6,400 eating establishments, and Balboa Park (the largest urban cultural park in the U.S.) is home to 15 museums, numerous art galleries, beautiful gardens, and the Tony Award-winning Old Globe Theatre.[54] [55]

The city is served by the San Diego Unified School District for elementary, middle, and high school options.[56]

San Marcos (Population: 94,833*)*

San Marcos is located between Vista and Escondido, approximately 35 miles north of Downtown San Diego. San Marcos is known for its resort climate, rural setting, central location, and affordable housing prices. Although San Marcos has experienced rapid growth over the last decade, it continues to maintain the small-town atmosphere that initially attracted many new community members.[57]

It is also home to two of the region's major educational facilities, Palomar College and California State University, San Marcos.[58] The city is served by the San Marcos Unified School District, which is the seventh largest district in San Diego with 19 schools—10 elementary schools, two K-8 schools, three middles schools, three high schools, and one independent study school.[59] [60]

Santee (Population: 60,037)

"Sunny climate, good schools, small-town friendliness"—Santee prides itself on having a lean government that responds to its community's concerns. Collectively, these are among the key attributes of the city. Santee is ideally located between the Pacific Ocean and the mountains of the Cleveland National Forest. While Santee is considered part of the East County Region, the city is only 18 freeway miles from San Diego's premier beaches. Santee is connected to the coastline by State Route 52, a six-lane freeway that connects Interstate 5 in La Jolla to State Route 67. State Route 125 also intersects with State Route 52, forming a transportation hub in the heart of Santee. Since the expansion of the San Diego Trolley, Santee community

[53] https://www.powayusd.com/en-US/District/About-Us

[54] https://www.sandiego.org/articles/about-san-diego-ca.aspx

[55] https://www.balboapark.org/performing-arts/the-old-globe

[56] https://www.sandiegounified.org/schools/all_schools

[57] https://www.san-marcos.net/live/about-us

[58] https://www.san-marcos.net/live/about-us

[59] https://www.smusd.org/about_us

[60] https://drive.google.com/file/d/15YZn-2ZnVwoAxEy-UTf1ETQvK9oVy7m9/view

members can ride the Trolley to Mission Valley, Downtown San Diego and as far as the U.S./Mexico Border.

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.

Water services are provided by Padre Dam Municipal Water District. The Santee School District and Grossmont Union High School District oversee K-12 education. Elementary and middle school students attend one of the nine available schools, while high school students attend Santana or West Hills High School. Nearby higher education facilities include San Diego State University and Grossmont Community College. [61] [62]

Solana Beach (Population: 12,941)

Solana Beach was incorporated in 1986 and is a four square-mile city regarded as one of the county's most attractive coastal communities. Solana Beach is known for its small-town atmosphere and pristine beaches, and 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).

The Pacific Ocean is to the west, the City of Encinitas to the north, and the City of Del Mar to the south. The unincorporated village of Rancho Santa Fe is located on the east side. Property values in this upscale community have appreciated significantly since incorporation. The business community has equally enjoyed the prosperity of a healthy economy, as Solana Beach is home for many artisans, high-tech businesses, and professionals.

The elementary school district is composed of five elementary schools, two of which are within the city limits. The middle school is under the administration of the San Dieguito Union High School District. High school students in the area attend Torrey Pines High School located to the southeast of Solana Beach. Additionally, there are several private and parochial schools in Solana Beach. [63]

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.

Vista (Population: 98,381) [64]

Vista is a thriving community that continues to grow and develop many new activities and attractions. The Moonlight Amphitheatre, AVO Playhouse, and the Wave Waterpark are just some of the many cultural activities the offered in Vista. Vista's Business Park is home to over 800 companies, with many global businesses relocating their headquarters, manufacturing, distribution, and marketing facilities to this business park. In addition, Vista

[61] https://www.cityofsanteeca.gov/our-city/about-santee-new

[62] https://www.santeesd.net/schools/district_school_sites

[63] https://www.ci.solana-beach.ca.us/index.asp?SEC=6BACDB03-96AC-47CC-9F5C-57082740FDAF&Type=B_BASIC

[64] https://datasurfer.sandag.org/dataoverview

Village has brought revitalization to the downtown area with dining, entertainment, shopping, and public amenities.[65]

The City of Vista is approximately 19 square miles and contracts with Vista Irrigation District for its water services. The city operates its own fire department and contracts with the San Diego Sheriff's Department for law enforcement services. [66]

There are 17 elementary and magnet schools, six middle schools, and seven high schools and magnet schools.[67]

Tribal Communities

Indigenous Americans have lived in the region for thousands of years. The four tribal groupings that make up the indigenous American Indians of San Diego County are the Kumeyaay (also referred to as Diegueño or Mission Indians), the Luiseño, the Cupeño, and the Cahuilla.

San Diego County has the largest number (18) of Indian reservations of any county in the United States.

The reservations include total land holdings of an estimated 193 square miles.[68]

Tribes can develop a Tribal Mitigation Plan independently or participate in a Multi-Jurisdictional Hazard Mitigation Plan, either with other Tribes or with one or more local governments.[69]

Special Districts

A Special District is an independent unit of local government set up to perform a specific function or a restricted number of related functions, such as street lighting or waterworks. A special district might be composed of cities, townships, counties, or any part or combination.

The 61 Special Districts in San Diego County are separate legal entities (governed by the Board of Supervisors) that provide for specialized public improvements and services deemed to benefit properties and community members, and financed by specific taxes and assessments.

The Special Districts provide authorized services including sanitation, flood control, road, park, lighting maintenance, fire protection, or ambulance service to specific areas in the county.[70] Therefore, Special Districts have the option to either create their own Local Hazard Mitigation Plan or partner with a local government to create a plan annex.[71]

[65] https://www.moonlightstage.com/about-us/rentals/avo-playhouse

[66] https://www.cityofvista.com/residents/about-vista

[67] https://www.vistausd.org/our_schools

[68] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

[69] https://www.fema.gov/sites/default/files/2020-06/fema-tribal-planning-handbook_05-2019.pdf

[70] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf.

[71] https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf

1.1.7. DEVELOPMENT OVER TIME

The San Diego County General Plan (which informs and is informed by this plan) applies to the unincorporated area of the county and is the County's long-term blueprint for the vision of the future. It reflects an environmentally sustainable approach to planning that balances the need for adequate infrastructure, housing, and economic vitality while maintaining and preserving existing communities, agricultural areas, and open spaces.

San Diego County is approximately 2.9 million acres of which 2.3 million acres are unincorporated areas. Within the unincorporated area, the County's land-use jurisdiction is limited by Tribal lands, and State and Federally owned lands, and military installations including Marine Corps Base Camp Pendleton. As a result, the County has land use jurisdiction over 772,239 acres or 35 percent of the unincorporated area. [72]

Wildfire and flooding are the chief vulnerabilities affecting development in San Diego County. When areas that were previously wildlands subject to periodic wildfires and flooding are developed, combustible structures and densified populations are necessarily introduced, and there may be changes to the threat potential for life and property. These vulnerabilities cannot be entirely eliminated but are significantly mitigated by development standards that require adherence to fire-resistant building codes; the creation and maintenance of defensible space; the avoidance of over-densification; the provision of safe and adequate population egress routes and the creation of buffer zones with low combustibility open spaces.

County staff have updated long range planning documents including the General Plan Safety Element in 2022 to include new evacuation route data, analysis, and policies in response to state law. Additionally, a Vulnerability Assessment and Adaptation Report was added to the Safety Element, which identifies how climate change is forecast to impact the county's unincorporated areas and summarizes climate adaptation plans and programs already in place. This Vulnerability Assessment also evaluates anticipated climate change impacts to the people and physical assets in the county's unincorporated areas and assesses the capacity to adapt to these impacts.

When reviewing proposed land development projects, from discretionary reviews through building permit plan check, staff ensure all local and state requirements are applied to projects. Plan check of discretionary projects includes a General Plan conformance review to ensure compliance with documents such as the newly adopted Safety Element, as well as an environmental review, to examine potential project specific impacts and risks through the lens of the California Environmental Quality Act (CEQA), working to lessen potential impacts such as wildfire and egress through analysis and mitigation efforts, to address potential vulnerability. This analysis includes close collaboration with local fire and emergency response entities to work towards projects that are designed and constructed safely. The County of San Diego has local building code requirements that go above and beyond the requirements of the California Building Code, to further provide homes and developments the opportunity to be built safely to protect communities and address vulnerability.

The County of San Diego routinely enhances its approach to analyzing and planning for development that may be in hazard prone areas. This is done through regular updates to documents such as the County General Plan, County Building Code, Consolidated Fire

[72] https://www.sandiegocounty.gov/pds/generalplan.html

Code, and Flood Damage Prevention Ordinance, among other planning documents. These updates enhance the safety of future development by evaluating impacts and incorporating mitigation efforts prior to construction. Local changes that enhance mitigation measures include the County of San Diego review of development in fire severity zones. The County of San Diego applies the same building code requirements to areas in moderate fire severity zones as it does to development in high and very high fire severity zones. The result is enhanced design and construction for moderately zoned fire severity locations in new homes and structures built today. In 2020, the County of San Diego further expanded wildfire protections by requiring more restrictive attic ventilation requirements to reduce the risk of embers entering homes. Mitigation efforts to protect against flood include building code requiring all new construction in flood-prone areas must provide raised finish floor elevation 1' above freeboard elevation.

For the period between 2018-2022, single family residences made up approximately 43 percent of the development activity in the unincorporated areas, while mobile homes and tracts of land comprised an additional 56 percent of the development activity. Permits for commercial development constituted 1 percent of the development activity. For a more detail description of development trends, see the 2021 General Plan Annual Progress Report available here:

https://www.sandiegocounty.gov/content/dam/sdc/pds/advance/GeneralPlan/2021%20General%20Plan%20Annual%20Progress%20Report.pdf

The table below summarizes development trends in the unincorporated County in the period since the preparation of the previous (2018) Hazard Mitigation Plan update, as well as expected future development trends:

TABLE 1: RECENT AND EXPECTED FUTURE DEVELOPMENT TRENDS

Criterion	Response						
Has your jurisdiction annexed any land since the preparation of the previous hazard mitigation plan? • If yes, give the estimated area annexed and estimated number of parcels or structures.	No						
Is your jurisdiction expected to annex any areas during the performance period of this plan? • If yes, describe land areas and dominant areas. • If yes, who currently has permitting authority over these areas?	No						
How many permits for new construction were issued in your jurisdiction since the preparation of the previous hazard mitigation plan?		**2018**	**2019**	**2020**	**2021**	**2022 as of 10/31/22**	**2022 Annualized**
	Single Family	531	528	446	631	598	652
	Tract	581	509	462	626	505	551
	Mobile Home	235	211	145	156	107	117
	Multi-Family (Commercial)	3	7	17	17	45	49
	Total	**1,350**	**1,255**	**1,070**	**1,430**	**1,255**	**1,369**

Criterion	Response
Describe the level of buildout in the jurisdiction, based on your jurisdiction's buildable lands inventory. If no such inventory exists, provide a qualitative description.	Dwelling unit capacity is an estimate of how much new development could occur theoretically over an unlimited time period. It represents the difference between the amount of development on the land today and the likely amount that could be built under the current land use. The remaining dwelling unit capacity for the unincorporated area is **60,748** units. Construction of these units may or may not happen and depends on obtaining approvals from the County. Infrastructure such as roads, sewers, storm drains, and water connections may be needed. Also, site-specific conditions may limit the number of units constructed such as animal habitats, steep slopes, and flood areas; and demand for new homes. For a more detailed description of dwelling unit capacity in the County, see the 2020 Housing Production & Capacity Portal Summary Report available here: PortalSummaryReport.pdf (sandiegocounty.gov)

While this development over time does not appear to be significant on it's own, the County's population growth associated with this development does appear significant.

The County of San Diego grew from the third to the second most populous County in California since the last update of this plan with the addition of 100,000 population members. This increase is population was accounted for throughout the update of this plan to help ensure vulnerabilities to hazards did not increase as well.

Therefore, development and growth over time were incorporated into the Local Planning Group's (LPG's) priorities as this plan's Goals, Objectives, and Actions/Priority Actions were updated.

Over the next five years and beyond, the County of San Diego Office of Emergency Services (County OES) will continue to collaborate with other County Department partners, such as the County Department of Planning & Development Services (the authors of the County's General Plan and related Progress Reports) to remain briefed on development short-term and long-term trends and potential changes in hazard vulnerabilities, and collaborate on hazard mitigation solutions. These briefings will also help County OES and the Hazard Mitigation Planning Group (HMPG) determine if priorities within this plan and it's projects need to be reevaluated and/or updated.

1.2. COMMUNITY RATING SYSTEM REQUIREMENTS

Flooding is a hazard that affects San Diego County. Meeting National Flood Insurance Program (NFIP) requirements is the most cost-effective way to reduce the flood risk to new buildings and infrastructure.[73] **The County of San Diego currently participates in NFIP**.

The Community Rating System (CRS) is a FEMA program and rewards communities that go beyond the minimum standards for floodplain management under the NFIP. Communities can potentially improve their Community Rating System and lower NFIP premiums by developing a CRS Plan.

For more information on the National Flood Insurance Program, see http://www.fema.gov/national-flood-insurance-program.

The following table compares CRS and Hazard Mitigation Plan requirements/tasks:

TABLE 2: FEMA LOCAL MITIGATION PLANNING HANDBOOK WORKSHEET 1.1 DESCRIBES THE CRS REQUIREMENTS MET BY THE SAN DIEGO COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN.

Community Rating System (CRS) Planning Steps	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Step 1. Organize	Task 1: Determine the Planning Area and Resources Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2. Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(1)
Step 3. Coordinate	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Step 4. Assess the hazard	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
Step 5. Assess the problem	
Step 6. Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i) 44 CFR 201.6(c)(3)(ii) 44 CFR 201.6(c)(3)(iii)
Step 7. Review possible activities	
Step 8. Draft an action plan	
Step 9. Adopt the plan	Task 8: Review and Adopt the Plan 44 CFR 201.6(c)(5)
Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

Two planning partners currently participate in the CRS program. The following table summarizes the CRS status of each. Many of the mitigation actions identified in this plan are creditable activities under the CRS program. Therefore, successful implementation of this plan offers the potential to enhance the CRS classification.

[73] https://www.fema.gov/floodplain-management/manage-risk

TABLE 3: CRS STATUS OF PARTICIPATING JURISDICTIONS.

Jurisdiction	NFIP Community #	CRS Entry Date	Current CRS Classification	Premium Discount	
				SFHA	Non-SFHA
Oceanside	060294	10/1/1991	8	10	5
San Diego County	060284	10/1/1994	7	15	5

Any jurisdiction or special district may participate in the hazard mitigation planning process. However, to request FEMA approval, each of the local jurisdictions must meet all requirements of 44 CFR §201.6. In addition to the requirement for participation in the process, the federal regulation specifies the following requirements for multi-jurisdictional plans:

- The risk assessment must assess each jurisdiction's risk where they may vary from the risks facing the entire planning area. (44 CFR §201.6(c)(2)(iii))
- There must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan. (44 CFR §201.6(c)(3)(iv))
- Each jurisdiction requesting approval of the plan must document that is has been formally adopted. (44 CFR §201.6(c)(5))

A hazard mitigation plan must clearly list the jurisdictions that participated in the plan and are seeking plan approval. The San Diego County Multi-Jurisdictional Hazard Mitigation Plan meets all requirements, including CRS requirements.

More information about this topic is discussed in Section 4 and 6 of this plan.

1.2.1. CATEGORIES OF FLOODPLAIN MANAGEMENT ACTIVITIES

Floodplain management is a community-based effort to prevent or reduce the risk of flooding, resulting in a more resilient community. Multiple groups with a stake in protecting their communities from flooding conduct floodplain management functions like zoning, building codes, enforcement, education, and other tasks.

While FEMA has minimum floodplain management standards for communities participating in the National Flood Insurance Program (NFIP), adopting higher local standards will lead to safer, stronger, more resilient communities.[74]

The different categories of floodplain management activities are detailed within this section. Related community capabilities and potential local projects (to be completed at future dates) are described respectively in Section 4 and Section 6 of this plan:

1. **Preventive** activities keep flood problems from getting worse. The use and development of flood-prone areas is limited through planning, land acquisition, or regulation. They are usually administered by building, zoning, planning, and/or code enforcement offices.

    - Floodplain mapping and data
    - Planning and zoning
    - Open space preservation
    - Stormwater management
    - Floodplain regulations
    - Drainage system maintenance

[74] Floodplain Management | FEMA.gov

- Erosion setbacks
- Building codes

2. **Property protection** activities are usually undertaken by property owners on a building-by- building or parcel basis.

- Relocation
- Retrofitting
- Acquisition
- Sewer backup protection
- Building elevation
- Insurance

3. **Natural resource protection** activities preserve or restore natural areas or the natural functions of floodplain and watershed areas. They are implemented by a variety of agencies, primarily parks, recreation, or conservation agencies or organizations.

- Wetlands protection
- Water quality improvement
- Erosion and sediment control
- Coastal barrier protection
- Natural area preservation
- Environmental corridors
- Natural area restoration
- Natural functions protection

4. **Emergency services** measures are taken during an emergency to minimize its impact. These measures are usually the responsibility of city or county emergency management staff and the owners or operators of major or critical facilities.

- Hazard threat recognition
- Critical facilities protection
- Hazard warning
- Health and safety maintenance
- Hazard response operations
- Post-disaster mitigation actions

5. **Structural projects** keep flood waters away from an area with a levee, reservoir, or other flood control measure. They are usually designed by engineers and managed or maintained by public works staff.

- Reservoirs
- Channel modifications
- Levees/floodwalls
- Storm drain improvements
- Diversions

6. **Public information** activities advise property owners, potential property owners, and visitors about the hazards, ways to protect people and property from the hazards, and the natural and beneficial functions of local floodplains. They are usually implemented by a public information office.

- Map information
- Library
- Outreach projects
- Technical assistance
- Real estate disclosure
- Environmental education



SECTION TWO: Build the Planning Team

Decorative Image

CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

2. SECTION TWO: BUILD THE PLANNING TEAM

This *San Diego County, California Multi-Jurisdictional Hazard Mitigation Plan (The Plan)* was prepared with input from:

- County public
- County of San Diego Groups, Agencies and Departments
- Eighteen Incorporated Cities
- The Port of San Diego
- Water Districts
- Fire Protection Districts
- Air Pollution Control District
- The National Weather Service/ National Oceanic and Atmospheric Administration
- Scripps Institution of Oceanography, University of California San Diego
- California Office of Emergency Services (Cal OES)
- Federal Emergency Management Agency (FEMA).

County public participation will be discussed in Section 3 of this plan.

Feedback and approval of this plan is provided by Cal OES and FEMA. County Board of Supervisors' approval then follows.

2.1. PLANNING PARTICIPANTS

Below is a detailed list of all other planning participant names, positions/titles, and agencies—**All below listed jurisdictions sought local, state, and federal approval as Multi-jurisdictional Hazard Mitigation Plan Annexes**:

TABLE 4: COUNTY OF SAN DIEGO GROUPS, AGENCIES AND DEPARTMENTS:

Name	Title	Department
Jeff Toney	Director	Office of Emergency Services
Stephen Rea	Assistant Director	Office of Emergency Services
Daniel Vasquez	Group Program Manager	Office of Emergency Services
Dominique D. Fonseca	Program Coordinator	Office of Emergency Services
Nick Zubel	Senior Emergency Services Coordinator	Office of Emergency Services
Rob Andolina	Emergency Services Coordinator	Office of Emergency Services
Shannon Nuzzo	Emergency Services Coordinator	Office of Emergency Services
Michael Robles	Senior Geographic Information Systems Analyst	Office of Emergency Services
Laura Caracciolo	Emergency Services Coordinator	Office of Emergency Services
Cody Gallagher	Emergency Services Coordinator	Office of Emergency Services
Tracy Dahlkamp	Student Worker (Graduate/Tech)	Office of Emergency Services
Ryan DeHart	Senior Emergency Services Coordinator	Office of Emergency Services (Fmr.)
Garrett Cooper	Deputy Director	Agriculture, Weights & Measures
Jesus Amial	Administrative Analyst	Agriculture, Weights & Measures
Austin Shepherd	Deputy Commissioner/Sealer	Agriculture, Weights & Measures
Vince Acosta	IT/GIS Coordinator	Agriculture, Weights & Measures
Brian Christison	Emergency Medical Services Coordinator	Emergency Medical Services
Todd Burton	Environmental Health Specialist III	Environmental Health & Quality

Name	Title	Department
Brad Long	Supervising Environmental Health Specialist	Environmental Health & Quality
Amy Harbert	Director	Environmental Health & Quality
Dave Nissen	Deputy Chief	Fire
Ryan Silva	Battalion Chief	CAL FIRE/Fire
Jessica A. Martinez	Community Risk Reduction Program Coordinator	Fire
Ashley Risueno	Administrative Analyst	Fire (Fmr.)
Jo Ann Julien	Health Planning and Program Specialist	Health & Human Service Agency
Sandi Hazlewood	Chief, Departmental Operations	Parks & Recreation
Judy Tjiong-Pietrezak	Senior Park Project Manager	Parks & Recreation
Chelsea Jander	Senior Park Project Manager	Parks & Recreation
Marco Mares	Region Manager	Parks & Recreation
Jason Hemmens	Deputy Director	Parks & Recreation
Tyler Farmer	Group Program Manager	Planning & Development Services
Mike Madrid	Land Use/Environmental Planner-Long Range Planning	Planning & Development Services
Robert Efird	Program Manager-Long Range Planning	Planning & Development Services (Fmr,)
Vince Nicoletti	Deputy Director	Planning & Development Services
Shannon Ackerman	GIS Analyst-Quartic Solutions	Planning & Development Services (GIS)
Jason Batchelor	GIS Coordinator	Planning & Development Services (GIS)
Ian Dawes	Senior GIS Analyst	Planning & Development Services (GIS)
Donna Johnson	Senior Emergency Services Coordinator	Public Health Services / Emergency Medical Services (Fmr.)
Derek Gade	Assistant Director	Public Works

Name	Title	Department
Mehdi Khalili	Civil Engineer	Public Works (Flood Control)
Matthew Schmid	Senior Civil Engineer	Public Works (Roads)
Greg Carlton	Senior Civil Engineer	Public Works (Roads)
Leann Carmichael	Senior Hydrologist	Public Works (Sustainability Planning Division)
Rene Vidales	Program Coordinator	Public Works
Richard Chin	Project Manager	Public Works (Roads)

EIGHTEEN INCORPORATED CITIES:

Name	City	Title
Don Rawson	Carlsbad	Emergency Services Coordinator
Kim Young	Carlsbad	Assistant Director of Emergency Services
David Harrison	Carlsbad	Assistant Director of Emergency Services (Fmr.)
Marie Jones-Kirk	Carlsbad	Program Manager
Marlon King	Chula Vista	Program Manager
Jayson Summers	Coronado	Division Chief
Jeff Terwilliger	Coronado	Emergency Management Coordinator (Fmr.)
Clem Brown	Del Mar	Environmental Sustainability & Special Projects Manager
Corina Jimenez	Encinitas	Senior Management Analyst
Lois Yum	Encinitas	Management Analyst
Jeff Murdock	Escondido	Emergency Preparedness Manager
Andy McKellar	Heartland (El Cajon, La Mesa, Lemon Grove)	Emergency Preparedness Coordinator
John French	Imperial Beach	Fire Chief
Walter Amedee	National City	Management Analyst III
David Parsons	Oceanside	Division Chief
Pete Lawrence	Oceanside	Division Chief
Katelynn Rise	Oceanside	Emergency Services Assistant (Fmr.)
Russ Cunningham	Oceanside	Principal Planner
Brian Mitchell	Poway	Deputy Fire Chief
Susy Turnbull	Poway	Disaster Preparedness Coordinator (Fmr.)
James Holmes	San Diego	Program Coordinator

Name	City	Title
Jennifer Dymicki	San Diego	Advanced Planning
Eugene Ruzzini	San Diego	Provisional Program Manager
Tiffany Allen	San Diego	Senior Homeland Security Coordinator (Fmr.)
Hannah Chasteene	San Diego	Senior Homeland Security Coordinator
Jamie Smith	San Marcos	Emergency Manager
Dave Pender	San Marcos	Fire Battalion Chief
Justin Matsushita	Santee	Deputy Fire Chief
Dustyn Garhartt	Santee	Fire Captain
DeVerna Rogers	Santee	Recreation Supervisor
Patricia Letts	Solana Beach	Administrative Assistant III
Rigma Viskanta	Solana Beach	Senior Management Analyst
Ned Vanderpol	Vista	Fire Chief
Edward Kramer	Vista	Emergency Manager
Jamie Smith	Vista	Emergency Management Coordinator (Fmr.)

PORT OF SAN DIEGO

Name	Jurisdiction	Title
Dave Foster	Port of San Diego	Homeland Security Program Manager
Cid Tesoro	Port of San Diego	Vice President, Facilities & Engineering

WATER AND IRRIGATION DISTRICTS:

Name	District	Title
Lisa Coburn-Boyd	Otay Water District	Environmental Compliance Specialist
Emilyn Zuniga	Otay Water District	Safety and Security Specialist
Larry Costello	Padre Dam Municipal Water District	Safety and Risk Manager
Charmaine Esnard	Rainbow Municipal Water District	Risk Management Officer
Lisa Prus	San Diego County Water Authority	Supervising Management Analyst
Eric Rubalcava	San Diego County Water Authority	Principal Asset Management Specialist
Anjuli Corcovelos	San Diego County Water Authority	Senior Water Resources Specialist
Clay Clifton	Sweetwater Authority	Program Specialist

Name	District	Title
Frank Wolinski	Vista Irrigation District	Director of Operations & Field Services
Alisa Nichols	Vista Irrigation District	Management Analyst (Fmr.)

FIRE PROTECTION DISTRICTS:

Name	District	Title
Jason McBroom	Alpine Fire Protection District	Fire Marshal
Dave McQuead	Rancho Santa Fe Fire Protection District	Fire Chief
Gehrig Browning	San Miguel Fire Protection District	Division Chief
Andrew Lawler	San Miguel Fire Protection District	Division Chief
W. Brent Napier	San Miguel Fire Protection District	Deputy Fire Marshal
Colton Israels	San Miguel Fire Protection District	Fire Inspector

****AIR POLLUTION CONTROL DISTRICT:***

Name	District	Title
David Sodeman	Air Pollution Control District	Chief, Department Operations
Domingo Vigil	Air Pollution Control District	Deputy Director

****THE NATIONAL WEATHER SERVICE (NWS)/ NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA):***

Name	Organization	Title
Alex Tardy	NWS/NOAA	Warning Coordination Meteorologist, Manager

****SCRIPPS INSTITUTION OF OCEANOGRAPHY, UNIVERSITY OF CALIFORNIA SAN DIEGO:***

Name	Institute	Association (Titles N/A)
Dan Cayan	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program
Alexander Gershunov	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program
Laura Engeman	Scripps Institution of Oceanography, UC San	Center for Climate Change Impacts and Adaptations

Name	Institute	Association (Titles N/A)
	Diego	
Julie Kalansky	Scripps Institution of Oceanography, UC San Diego	California Nevada Applications Program

**These three organizations are not seeking Annex approval.*

2.2. PLANNING PROCESS

The overall planning process for The Plan was led by the County of San Diego Office of Emergency Services (County OES), who established a Hazard Mitigation Planning Group (HMPG) to coordinate development of the Plan. Representatives from each listed incorporated city, special district and the unincorporated county were designated by their jurisdiction as the HMPG member.

Each HMPG member identified a Local (internal) Mitigation Planning Team for their department, jurisdiction, special district, and other organizations 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 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 HMPG members brought this information to HMPG 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 above, in Section 2.

All HMPG members were provided an overview and training of hazard mitigation planning elements at the HMPG meetings. The HMPG training was designed after FEMA's "Local Mitigation Planning Handbook" worksheets, which led the HMPG members through the process of defining the jurisdiction's assets, vulnerabilities, capabilities, goals, objectives, and actions. The HMPG members were also given additional action items at each meeting to be completed by their Local Mitigation Planning Team.

HMPG members also participated in workshops to present the risk assessment, preliminary goals, objectives, and actions. In addition, several HMPG 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 necessary partners for approval.

Throughout the planning process, the HMPG 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 data sources listed in references. These data sources contain the most recent data available for the San Diego region. A 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 the data used was the most recent available for each participating jurisdiction. The HMPG members reviewed these maps and were provided the opportunity to communicate updates or changes to the critical facilities/assets or hazard layers to County OES in November 2021. Data received from HMPG members were added to the hazard database and used in the modeling process described in the Risk Assessment portion of the Plan (Section 5). The data used in this plan revision is considered more accurate than the original plan.

2.2.1. EXISTING POLICIES, PLANS, PROGRAMS, & RESOURCES

Hazard Mitigation Planning Group (HMPG) members and their corresponding Local Mitigation Planning Teams prior to and during the planning process reviewed and incorporated several existing policies, plans, studies, guides, programs, and other resources to inform the Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) and its processes. These items included FEMA documents, emergency services documents as well as county and local general plans, community plans, local codes and ordinances, and other similar documents. The documents included, but were not limited to:

- San Diego County's/Cities' General Plans & Safety Element
    - In 2021, the Board of Supervisors adopted the update to the San Diego County General Plan's Safety Element. The County proactively addresses hazards through the General Plan Safety Element and has many references to the MJHMP. Representatives from the General Plan's planning group are also members of the HMPG—ensuring that both plans are integrated and contain mutually-reinforcing policies. The General Plan and the 2023 MJHMP Update work together to achieve the goal of hazard risk reduction. Future updates of the General Plan, including incorporation by reference of the 2023 MJHMP into the Safety Element will continue to ensure consistency between both plans.
    - This specific update of The Plan required incorporation of updates into the County's Safety Element (lead by Planning & Development Services) to demonstrate progress of local hazard mitigation efforts. Plan leads (listed in Section 2 of this plan) met as needed to collaborate on cohesive updates, then discuss how and where to include the update within their respective plans.
- San Diego County Strategic Plan/Initiatives
    - Informs all existing/new County Plans and priorities, such as new/updated programs and projects, including this plan.
    - The County's Strategic Initiatives (Sustainability, Equity, Empower, Community, and Justice) were all incorporated into this plan's updated Goals, Objectives, and Actions. [75]
- County of San Diego Operational Area Emergency Operations Plan 2022
    - Annexes inform this plan/delegation of responsibilities, and this plan also informs the County of San Diego Operational Area Emergency Operations Plan 2022.
    - A key element of the update process for the MJHMP was the review of the County of San Diego Operational Area Emergency Operations Plan (OA EOP). The HMPG stayed informed of major review findings of the OA EOP with the intent to integrate with key components of the MJHMP. Future updates to the OA EOP will coincide with the future updates of the MJHMP.
- Geographic Information System (GIS) Data & Maps
    - Base map shape files used for items such as city jurisdictions, county jurisdictions, parcels, rivers, and roads to establish critical facilities and a GIS map for this plan.
- FEMA Flood Insurance Rate Map
    - 100- and 500-year floodplain data was acquired to profile flood hazard and carry out the related vulnerability assessment.

[75] https://www.sandiegocounty.gov/content/dam/sdc/cao/docs/stratplan.pdf

- Legislation
    - Newly passed legislation is often required to be included in County plans, including this plan, which is completed by the Planning Group every December.
    - Various legislation/statutes added requirements and guidance for inclusion into the Hazard Mitigation Plan. For example, Assembly Bill No. 1409 (Planning and Zoning: General Plan: Safety Element) describes the need to integrate evacuation routes and locations used for shelters (e.g. Temporary Evacuation Points (TEPs) and more).
- Various Local Codes and Ordinances
    - Local Emergency Managers, including members of the Planning Group, meet bi-monthly to discuss plan and procedure updates (including new/updated local codes and ordinances) that may affect the planning area and require incorporation into plans. Examples of these local codes and ordinances include building codes and fire codes, which help the HMPG inform this plan's Goals, Objectives, and Actions.
- FEMA Local Mitigation Handbook March 2013
    - The Planning Group researched, trained on, and referenced this item on a weekly basis to inform this plan and all related procedures.
- FEMA Mitigation Ideas January 25, 2013
    - The Planning Group researched, trained on, and referenced this item while completing Sections 4-6 of this plan, which also informed all related procedures.
- Integrating Hazard Mitigation and Climate Adaptation Planning – ICLEI
    - The Planning Group researched, trained on, and referenced this item while completing Section 4-6 of this plan, which also informed all related procedures.
    - The Planning Group partnered with scientists and researchers at UCSD Scripps Institution of Oceanography, who study and contribute work related to Climate Change impacts and adaptation. The Planning Group provided the Scripps team with a list of all hazards included in this plan and asked them to provide descriptions of climate change impacts, and mitigation recommendations. UCSD Scripps Institution of Oceanography's work and responses are incorporated throughout this plan and are included in this plan's sources and footnotes.
- Climate Change Impacts in the United States – U.S. Government Printing Office
    - The Planning Group researched, trained on, and referenced this item while completing Section 4-6 of this plan, which also informed all related procedures.
    - The Planning Group partnered with scientists and researchers at UCSD Scripps Institution of Oceanography, who study and contribute work related to Climate Change impacts and adaptation. The Planning Group provided the Scripps team with a list of all hazards included in this plan and asked them to provide descriptions of climate change impacts, and mitigation recommendations. UCSD Scripps Institution of Oceanography's work and responses are incorporated throughout this plan and are included in this plan's sources and footnotes.

- Local Mitigation Plan Review Tool 2019
    - The Planning Group researched, trained on, and referenced this item on a weekly basis to inform this plan and all related procedures.
- California State Hazard Mitigation Plan 2018
    - The Planning Group researched and referenced this item on a monthly basis to inform this plan and all related procedures. The HMPG reviewed hazard profiles, hazard assessment data to ensure consistency with the information contained within this plan.
    - The California State Hazard Mitigation Plan 2018 was also used to inform this plan's layout, hazard inclusion/omission rationale, and the risk assessment/consequence analysis, which is included within Section 5 of this plan.

Task Four of the FEMA Local Mitigation Handbook, Sections 1, 4, and 7 of this plan, and jurisdiction-specific annexes describe the process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans. The County of San Diego specifically meets with all necessary partners to collaborate on planning mechanisms/updates, conducts an approval process through the public, department leadership, Unified Disaster Council (UDC) voting/approval, then Board of Supervisor and other elected official approval. All listed steps were conducted on necessary and required bases.

This specific update of The Plan required incorporation of updates into the County's Safety Element (lead by Planning & Development Services) and Emergency Operations Plan (lead by County OES) to demonstrate progress of local hazard mitigation efforts. Plan leads (listed in Section 2 of this plan) met as needed to collaborate on cohesive updates, then discuss how and where to include the update within their respective plans.

Additionally, listed below 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 policies/regulations related to mitigation efforts within the community. The administrative and technical capabilities of the County, as discussed below, and in Section 4 of this plan, provide an identification of the staff, personnel, and department resources available to implement the actions identified in Section 6 of this 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 human-caused hazards, floodplain managers, surveyors, personnel with GIS skills and scientists familiar with hazards in the community:

- **San Diego County Planning Development Services**

  The goals of these departments are to maintain and protect public health, safety, and well-being, and preserve and enhance the quality of life for County community members by maintaining a comprehensive general plan and zoning ordinance, implementing habitat conservation programs, ensuring regulatory conformance, and performing comprehensive community outreach. This Department is comprised of the following six divisions:

- **Long Range Planning Division**: Implements the long-range vision planning for the unincorporated portion of San Diego County. This division is responsible for maintaining the zoning ordinance and County's General Plan, a document that provides the framework for future growth and development in the County. Long Range Planning processes regular updates to other land development policies and ordinances and manages a variety of ongoing activities that derive from federal, state, and local mandates
- **Sustainability Planning Division**: Composed of the Sustainability Team, the Conservation Team, and the Sustainable Groundwater Management Act (SGMA) Team. The Sustainability Team manages implementation of the County's 2018 Climate Action Plan (CAP), which contains a series of measures to reduce greenhouse gas (GHG) emissions over the next 30 years; along with the CAP Update, which will culminate in the adoption of a plan that will exceed State GHG emissions reductions of 40% below the 1990 level by 2030 and meet a goal of reducing emissions to net zero between 2035-2045. The Conservation Team develops and implements programs that contribute to the conservation of biological, environmental, and agricultural resources in the unincorporated area. The SGMA Team oversees County implementation of SGMA, which provides a framework to regulate groundwater in certain basins in California.
- **Building Division:** Reviews site and building plans for compliance with all applicable codes, issues land use and building permits, and enforces building and zoning regulations.
- **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—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 aerial support unit, 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 community members in rural areas.

- **San Diego County Housing & Community Development**

  Improve the quality of life in our communities—helping families find safe and affordable housing, and partnering with property owners to increase the supply and availability of affordable housing. This department provides many valuable services to both property owners and tenants, and strives to create more livable neighborhoods that community members are proud to call home.

  Key service programs include improving neighborhoods by assisting community members who have low incomes, increasing the supply of affordable, safe 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 persons with low- and moderate-income, 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 Acquired Immunodeficiency Syndrome (AIDS), and the Emergency Solutions Grant Program. Participating cities, community members, nonprofit organizations and other county departments may submit grant proposals.

- **County of San Diego Emergency Medical Services (EMS)**

  The mission of this department is to ensure all community members 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 department within the Public Safety Group.

- **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.

This department's function is 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
5. Developing and providing preparedness materials for the public.

- **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.

- **County Public Health Preparedness and Response**
  Public Health Preparedness and Response coordinates with Emergency Medical Services, Office of Emergency Services, 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 Department of Environmental Health and Quality's (DEHQ**)
  This department's mission is to protect the environment and public health. It accomplishes this through the work of its four divisions:
  - **Food and Housing (FHD) Division**: Conducts retail food facility inspections and issues the appropriate A-B-C grade card. The division is also responsible for inspecting swimming pools, body art facilities, apartments, hotels and motels in contracted cities and the unincorporated area, organized camps and detention facilities. FHD responds to public health threats and environmental hazards

associated with these regulated facilities, including illness investigations, fires, food recalls and boil water orders, all in the interest of promoting safe communities.

- **Land and Water Quality Division**: Conducts water quality testing of beaches and bays and posts the results for residents and visitors; reviews plans for and inspects onsite wastewater treatment systems, recycled water systems, water wells, monitoring wells, and mobile home parks in the unincorporated county; is the Local Enforcement Agency for solid waste facilities; and conducts collection of household hazardous materials in the unincorporated county. In addition, this division oversees cleanup of contaminated property, including from clandestine drug laboratories, and enforces state solid waste laws and regulations at landfills and composting facilities throughout the county, with the exception of the City of San Diego.
- **Community Health Division**: Coordinates the county's asbestos and lead programs, operates the radiological health program, and runs the vector control program to keep the region safe from diseases such as West Nile virus, hantavirus, Lyme disease, and others. It was also instrumental in the new countywide program to control eye gnats.
- **Hazardous Materials Division**: Regulates more than 13,000 businesses to ensure that hazardous materials, and hazardous and medical wastes are properly catalogued, stored, and managed. The Hazardous Incident Response Team (HIRT) responds to spills and works with various other agencies in cleanup operations. Public outreach and educational programs range from schools to newsletters and web sites.

- **California Department of Forestry and Fire Protection**

  CAL FIRE is an emergency response and resource protection department that responds to wildland fires that burn across the state. In addition, department personnel respond to other emergency calls, including structure fires, automobile accidents, medical aid, swift water rescues, civil disturbance, search and rescue, floods, and earthquakes.

  CAL FIRE is the State's largest fire protection organization, whose fire protection team includes extensive ground forces, supported by a variety of fire-fighting equipment. CAL FIRE has joined with Federal and local agencies to form a statewide mutual aid system. This system ensures a rapid response of emergency equipment by being able to draw on all available resources regardless of jurisdiction. CAL FIRE 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.

2.2.2. INVITATION TO PARTICIPATE

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 (USDCESO). Its governing body is the Unified Disaster Council (UDC) (as described in Section 1 of this plan).

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 were offered the opportunity to participate in the development of this plan.

The original development of the Hazard Mitigation Plan, as well as this current revision, were conducted under the auspices of the UDC. At the direction of the UDC, the San Diego County Office of Emergency Services (County OES) acted as the lead agency in the revision of this plan. San Diego County OES requested input from each jurisdiction in the county.

Each municipality, special district, and neighboring jurisdictions were formally invited to attend a meeting to develop an approach to the planning process and to form the Hazard Mitigation Planning Group (HMPG). These invitations were in the form of an email to each jurisdiction. At the August 29, 2019 UDC meeting, it was announced that the plan was reaching the five-year mark and required updating. [76]

Each jurisdiction/participating party (documented within Section 2 of this plan) later confirmed their participation in the HMPG. In addition to the eighteen incorporated cities, County 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 or non-profit organizations interested in the involvement of the planning process.

The HMPG formed to undertake the planning process and meeting dates were set for all members to attend. Each participating jurisdiction then formed their own Local Hazard Mitigation Planning Team. Details on the membership of those teams can be found in each jurisdiction's annex. Local Hazard Mitigation Planning Teams met either before or after the overall HMPG met to discuss regional meeting topics and assignments.

The 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
- Chamber of Commerce
- Federal Agencies (USN, USMC, USCG, DHS)
- Hospitals
- Port of San Diego
- State Agencies (Cal OES, DMV, Caltrans)
- School Districts
- Universities and colleges

[76] https://www.sandiegocounty.gov/content/dam/sdc/oes/docs/UDC_Documents/2019/October/04.%20August%20UDC%20Minutes_2019.pdf.

- Utilities (Power- SDG&E, Water – San Diego County Water Authority and Water Districts, Cable, telephone, and internet – Cox Communications)

Tribal Communities were also invited to participate in this plan update and/or discuss Tribal Hazard Mitigation Plans on April 26, 2022.

2.2.3. HAZARD MITIGATION PLANNING GROUP MEETINGS

The Hazard Mitigation Planning Group (HMPG) met regularly, as did the County of San Diego Local (County-specific) Hazard Mitigation Planning Group. The following is a list of meeting dates and objectives:

1. **Initial HMPG and County Planning Meetings:**

   September 2019—Kickoff meetings and Formation of HMPG

2. **HMPG Meeting 1:**

   October 8, 2019—Overview of Planning Process/Assessing Risks, Identify Partners, and Review Due Dates

3. **County Local Planning Meeting 1:**

   November 1, 2019—2018 Plan Version Capabilities Review, Assignment of Review, Review Objectives and Due Dates

4. **HMPG Meeting 2:**

   December 3, 2019—Review Schedule and Process, Review/Complete FEMA Task 4 (Review Community Capabilities)

5. **County Local Planning Meeting 2:**

   January 21, 2020—Review Objectives/Due Dates and Discuss Subject Matter Experts for each project, Assignment of County Departments for FEMA worksheet Tasks, Discuss Community Assets

6. **FEMA Meeting:**
   November 13, 2020—Meeting with federal and state partners to review the current plan update process
7. **HMPG Refresher Meeting:**

   January 11, 2021—Review updated planning calendar/schedule and allowed time for questions-and-answer session with state and federal partners

8. **Refresher County Planning Meeting:**

   January 18, 2021—Review updated planning calendar/schedule and allowed time for questions-and-answer session with state and federal partners

9. **County Local Planning Meeting 3:**

   March 1, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

10. **County Local Planning Meeting 4:**

    March 15, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

11. **County Local Planning Meeting 5:**

    April 12, 2021—Discussion from Subject Matter Experts about assignments/projects and update on progress/completion of FEMA Tasks 1-4

12. **HMPG Meeting 3:**

    April 26, 2021—Review Risk Assessment/Development of Mitigation Plan, GIS roles, Hazard Identification/Risk Assessment Processes, due dates, and Review/Complete FEMA Tasks 1-4

13. **Hazards Workshops/Seminars:**

    May-July 2021 (Tuesdays and Thursdays) —Subject Matter Experts present about different operational area hazards and suggest mitigation actions. Panel discussions and opportunity for planning group questions

14. **County Local Planning Meeting 6:**

    July 22, 2021—Review supplemental data associated with the risks, Discuss Risk Assessment Process and county mitigation strategies with Subject Matter Expert guidance

15. **County Local Planning Meeting 7:**

    October 20, 2021—Discuss assignment turnover to new project manager, Review/Complete FEMA Task 5 (Conduct a Risk Assessment)

16. **HMPG Meeting 4:**

    October 26, 2021—Review updated schedule/due dates, Hazard Identification Process, Risk Assessment Process, Hazard Profiling and Loss Estimation, Review/Complete FEMA Task 5 (Conduct a Risk Assessment)

17. **Cal OES 2021 HMGP Webinar**

    November 18, 2021—Discussion of HMGP sub-application instructions and requirements

18. **Cal OES Grant Program Notice of Interest (NOI) Webinar:**

    December 14, 2021

19. **County Local Planning Meeting 8:**

    January 19, 2022—Review/Complete FEMA Task 6 (Develop a Mitigation Strategy)

20. **HMPG Meeting 5:**

    February 1, 2022—Finalize FEMA Planning Worksheets for Task 6, Discuss Public Survey and Forum, Start FEMA Worksheets for Task 7, Discuss deadlines

21. **County Local Planning Meeting 9:**

    February 11, 2022—Review/Complete FEMA Task 7 (Keep the Plan Current)

22. **Cal OES Sub-Application Development Series:**

    February 2022—Discussion of HMGP sub-application instructions and requirements for various hazards

23. **HMPG Meeting 6:**

    March 7, 2022—Finalize FEMA Task 7 Worksheets, Discuss Cal OES/FEMA Funding and Training Opportunities, Discuss action items and deadlines

24. **Whole Community Outreach Survey:**

    April 1, 2022—Release was communicated with and shared by planning partners

25. **HMPG Individual Meeting Series:**

    March-April 2022—Check in meetings with all planning participants to ensure deadlines are met and final question were answered

26. **Plan Peer Review:**

    April 28-29, 2022—County Office of Emergency Services peers compared existing plan draft to FEMA grading requirements (2019 Local Plan Review Tool) and provided feedback

27. **Public Forum:**

    May 28, 2022—All planning participants and the public were invited to review key survey results and provided resources for further input

Work drafts, products, and the final plan were shared electronically. Additional meetings not included on the above list were impromptu requests for one-on-one guidance and virtual/in-person meetings with planning partners.

Not all partners were able to attend all meetings. Follow-up phone calls, question-and-answer sessions, and in-person meetings were conducted with those not able to attend to ensure they were kept current on the process, assignments, and deadlines.

Follow-up meetings with planning partners continued until final draft submission to Cal OES and FEMA (June 2022).

2.2.4. HAZARD MITIGATION PLANNING GROUP MILESTONES

The approach taken by the Hazard Mitigation Planning Group (HMPG) 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:

Planning Group Meetings (September 2019 – June 2022):
As listed in the previous section, a series of HMPG meetings were held in which the HMPG 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), September 2019 through June 2022. The meetings evolved as the planning process progressed and were designed to aid

the jurisdictions in completing FEMA worksheets that helped define hazards within their jurisdictions, their existing capabilities and mitigation goals and action items for the Hazard Mitigation Plan.

Hazards Workshops/Seminars (June 2021-July 2021):
A series of workshops discussed the impact of all hazards impacting the operational area to educate local planners and community members. Topics discussed included, but were not limited to, climate change, sea level rise, drought, changes to precipitation patterns and extreme weather, wildfire, terrorism, 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, objectives, and actions.

Risk Assessment (June 2021 – January 2022):
The HMPG used the list of hazards from the 2018 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 HMPG 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 HMPG 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 HMPG 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. This was a similar process to that used in the original plan and first update.

Goals, Objectives, and Alternative Mitigation Actions (January 2022- February 2022)
Based on this understanding of the hazards faced by the County, the goals, objectives, and actions identified in the 2018 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 challenges. HMPG members then added updated priorities in the form of listed goals, objectives, and 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 County Office of Emergency Services staff. Additionally, plan compatibility with existing plans and regulations was considered and accounted for.

Mitigation Plan and Implementation Strategy (January 2022- February 2022):
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.

Mitigation Action Progress Report (February 2022- June 2022)
If applicable, jurisdictions completed a progress report for their previous 2018 plan. All HMPG members were also asked to complete a FEMA Plan Evaluation (Section 7 of this plan) as a resource to help keep this plan current.

SECTION THREE: Create an Outreach Strategy



Decorative Image

Photo by Kevin Pack
CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

3. SECTION THREE: CREATE AN OUTREACH STRATEGY

The County of San Diego's Hazard Mitigation Outreach Strategy is based on the Federal Emergency Management Agency's (FEMA's) Whole Community Approach and governed by existing department, local, state, and federal plans, regulations, and budgets.

The Whole Community Approach supports inclusive management practices, and it's three principles help guide the County of San Diego's Hazard Mitigation Outreach Strategy.

3.1. WHOLE COMMUNITY APPROACH

The County of San Diego/the Operational Area develop and update emergency plans in accordance with local, state, and federal policies and guidance. The Federal Emergency Management Agency (FEMA) provides a strategic framework to guide all members of the emergency management community as they determine how to integrate the Whole Community Approach and related concepts into their daily practices. FEMA's guidance and this plan are not intended to be all-encompassing or offer specific actions that require adoption of certain protocols.

Instead, the Whole Community Approach is acknowledged as a general process by which the public, emergency management representatives, organizational and community leaders, tribal partners, and government officials can understand and assess the needs of their respective communities, then determine the best ways to organize and strengthen resources, capacities, and interests. The Whole Community Approach, overall, is intended to increase individual preparedness, prompt engagement with vital community partners, and enhance community resiliency and security. More information about this approach and other concepts can be located on FEMA's website (www.FEMA.gov).

Community resilience within emergency management consists of three key factors:

1. The ability of first responder agencies (e.g., fire, law, emergency medical services) to divert from their day-to-day operations to the emergency effectively and efficiently.
2. The strength and inclusivity of the emergency management system and organizations within the region to include the Emergency Operations Center (EOC), mass notification systems, emergency public information systems, etc.
3. The civil preparedness of the region's people, businesses, and community organizations.

Enhancing all three of these factors constantly focuses the Operational Area on improving the region's resiliency. Emergency response effectiveness also largely depends on the preparedness and resiliency of the collective communities within a region. Different types of communities exist including, but not limited to, communities of place, interests, beliefs, and circumstances, which can exist geographically and virtually (e.g., online gatherings/forums, etc.). While multiple factors can contribute to community resilience and effective emergency management resources and outcomes, FEMA recommends three principles to establish a Whole Community Approach:

1. Understand and meet the actual needs of the whole community
2. Engage and empower all parts of the community
3. Strengthen what works well in communities

A deep understanding of the unique and diverse needs of a population (including demographics, values, norms, community structures, networks, relationships, and experiences) is crucial for emergency managers to best ascertain the population's real-life safety needs and motivation to participate in preparation and mitigation activities prior to an emergency event.

A Whole Community Approach towards building community resilience requires finding ways to support and strengthen the relationships, institutions, structures, assets, and networks that already exist, work well in communities, and address issues that are important to community members. Engaging the whole community and empowering local action in this manner will best position all stakeholders to plan for/meet the actual needs of a community and strengthen local capacity/resilience to recover from threats and hazards.[77]

This plan was developed in alignment with the Whole Community Approach through collaboration with and guidance from representatives of the California Governor's Office of Emergency Services (Cal OES), Cal OES' Office of Access and Functional Needs (OAFN), County departments/agencies/groups, special districts, OA City departments, law enforcement, fire services, emergency management, people with access and functional needs, tribal community liaisons, business and industry partners, and various other public and private stakeholders.

3.1.1. INCLUSIVE EMERGENCY MANAGEMENT PRACTICES

The County of San Diego and the County Office of Emergency Services (County OES) are committed to achieving and fostering a Whole Community emergency management system that is fully inclusive of all individuals. Individual differences include, but are not limited to, ability, access and functional needs, age, life experience, military/veteran status, race, ethnicity, socio-economic class, marital status, parental status, gender/gender expression, sexual orientation, national origin, and religion.

Through the integration of community-based organizations, service providers, government programs, individuals with disabilities, and individuals with access and functional needs into the planning process, meaningful partnerships are developed and leveraged.

These partnerships help enable the region to support community in the San Diego Operational Area, and all programs, services, and activities provided to people during emergency events, to the maximum extent feasible, will be inclusive of all individuals. The following items are examples of inclusive service delivery and support:

- Accessible transportation
- Assistance animals
- Dietary restrictions and needs
- Assistive equipment and services
- Accessible public messaging
- Evacuation assistance
- Restoration of essential services
- Language translation and interpretation services

[77] https://www.fema.gov/sites/default/files/2020-07/whole_community_dec2011__2.pdf

- Service delivery site Americans with Disabilities Act of 1990 (ADA) compliance

The County of San Diego partners with a broad network of trusted community organizations and agencies (e.g., churches, non-profit organizations, refugee resettlement organizations) called the “Partner Relay” to accomplish inclusive practices through sharing emergency information with communities that may have limited English proficiency.

In addition to observing inclusive preparation, mitigation, and response practices, the County of San Diego also incorporates existing and new local, state, and federal laws that govern emergency planning and response efforts. Examples of the County of San Diego’s compliance with federal laws that prohibit discrimination on the basis of disability within emergency management programs include this plan’s incorporation of:

- Americans with Disabilities Act of 1990
- Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988
- Individuals with Disabilities Education Act of 1975
- Post-Katrina Emergency Management Reform Act of 2006
- Rehabilitation Act of 1973
- Fair Housing Act Amendments of 1988
- Architectural Barriers Act of 1968
- Twenty-First Century Communications and Video Accessibility Act of 2010
- Telecommunications Act of 1996

Additionally, the County of San Diego complies with California Government Code § 8593.3, which requires government agencies to integrate planning for the needs of individuals with access and functional needs into emergency operations plans. Code § 8593.3 compliance also includes planning for individuals who have:

- Developmental or intellectual disabilities
- Physical disabilities
- Chronic conditions
- Injuries
- Limited English proficiency or people who do not speak English
- Low-income,

and individuals who are:

- Older adults
- Children
- Pregnant
- Living in institutionalized settings,

and individuals who are experiencing:

- Homelessness
- Transportation disadvantages, including, but not limited to, people who are dependent on public transit.

For further details on County OES' Whole Community Approach to emergency management and the integration of inclusive emergency management practices, refer to the County of San Diego's Emergency Operations Plan: Basic Plan. [78]

3.2. COMMUNITY OUTREACH STRATEGY

The County Office of Emergency Services (County OES) recognized the importance of public feedback throughout the plan update process to account for community hazard concerns and to gauge community preparedness and education needs. Therefore, County OES' Community Outreach Strategy provided multiple ways and opportunities for the public to provide input:

- Webpage and Email Address
- Telephone availability
- Survey
- Public Forum

3.2.1. WEBPAGE AND EMAIL ADDRESS

A Hazard Mitigation Plan webpage, as part of the San Diego County Office of Emergency Services' (County OES') website, was developed and published years ago to provide the public with information and methods to provide feedback—such as the dedicated hazard mitigation email address that is checked daily by County OES staff for any public questions and/or feedback.

Other Items posted on the webpage include the current plan and jurisdiction annexes. [79]

3.2.2. TELEPHONE, MAIL, & FAX AVAILABILITY

The San Diego County Office of Emergency Services' home website provides the public with contact information to ask questions and/or provide feedback via telephone, mail and/or fax. [80]

3.2.3. SURVEY

A detailed community engagement survey (for both this plan and the County's Emergency Operations Plan) was developed by the County Office of Emergency Services' (County OES') Planning Participants, translated into six total languages, published on County OES' website for public response, shared via all County OES social media accounts, then advertised via a County News Center article. [81]

The survey was also shared with all regional Planning Participants and other partners (such as the Partner Relay, Unified Disaster Council (UDC) members, Emergency Managers, the County Committee for Persons with Disabilities, County Employee Resource Groups and

[78] https://www.sandiegocounty.gov/content/sdc/oes/emergency_management/oes_jl_oparea.html

[79] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html.

[80] https://www.sandiegocounty.gov/content/sdc/oes.html.

[81] https://www.countynewscenter.com/help-the-county-update-emergency-plans/.

County policy aides), with the request for these partners to share the survey with their community networks.

The survey sought public input about top hazard concerns and gauged the public's hazard education and readiness so future hazard mitigation projects/action items (detailed in Section 6 of this plan) can incorporate this feedback and enhance community preparedness before a disaster occurs. Survey respondents were also asked to provide their email address if they were interested in attending County OES' Community Engagement Public Forum, described in the next section.

The community engagement survey was active from April 1, 2022 to May 9, 2022 and received 500 total responses.

The survey results, and related public forum recording, were posted to County OES' Hazard Mitigation Plan webpage for 30 days. [82]

3.2.4. PUBLIC FORUM

The County Office of Emergency Services' (County OES') contacted the survey recipients who requested a Public Forum invitation on May 16, 2022 to provide Public Forum details, instructions, and to offer language translation services upon request. County OES then hosted the recorded Community Engagement Public Forum on Monday, May 23, 2022, at 10 AM, via a virtual collaboration platform. The forum presenters discussed the community engagement survey results and shared methods to: receive personal disaster plans, hazard preparation and mitigation resources, ask more hazard mitigation questions and/or provide additional feedback.

The public forum recording, and related survey results, were posted to County OES' Hazard Mitigation Plan webpage for a minimum of 30 days. [83]

3.2.5. FEEDBACK INCORPORATION

Public involvement was valuable in the development of this plan update. The areas of concern provided via all outreach methods were used by each jurisdiction while developing and/or updating mitigation goals, objectives, and actions. Additionally, public feedback was also used, in conjunction with hazard data, to determine the top hazards of concern for the region profiled in Section 5 of this plan.

The public can continue public participation in the plan maintenance process by emailing the hazard mitigation email address, calling the County Office of Emergency Services' (County OES) during business hours and/or providing feedback during future outreach opportunities that will be advertised on our website, social media platforms and shared with regional partners.

City-, special district-, or other organization-specific feedback should be provided directly to those parties via their advertised methods.

[82] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html

[83] https://www.sandiegocounty.gov/oes/emergency_management/oes_jl_mitplan.html

SECTION FOUR: Review Community Capabilities



Decorative Image

Photo by Jeff Hall
CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

4. SECTION FOUR: REVIEW COMMUNITY CAPABILITIES

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities and must be included in a hazard mitigation plan by the Planning Group.

The Planning Group may also identify additional types of capabilities relevant to mitigation planning.

4.1. CAPABILITY ASSESSMENT

The primary types of capabilities for reducing long-term vulnerability through mitigation planning are:

- Planning and Regulatory
- Administrative and Technical
- Financial
- Education and Outreach

4.1.1. PLANNING AND REGULATORY

Planning and Regulatory Capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards.

Overall, this jurisdiction can expand upon these capabilities by creating and applying an updated five-year Multi-Jurisdictional Hazard Mitigation Plan Cycle, Work Plan, and Charter to:

- identify plans that need incorporation into the next update of this plan
- identify plans that will need to be informed by this plan
- outline the next five-year cycle of this plan's update with the addition of planning partner expectations, assignments/deliverables, tentative deadlines, resources available, in-person workshops/training dates/agendas, vulnerability assessment needs, and planning meeting dates.

The following table summarizes the jurisdiction's planning and regulatory capabilities:

TABLE 5: PLANNING AND REGULATORY CAPABILITIES

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive / Master Plan	Yes, 2021	The County of San Diego General Plan, which includes the Safety Element and references back to the Hazard Mitigation Plan, outlines projects and strategies that could be implemented in the areas of conservation, housing, noise and land-use. Per the Plan: This document is the first comprehensive update of the San Diego County General Plan since 1978 and is the result of the collective efforts of elected and appointed officials, community groups, individuals, and agencies who spent countless hours developing a framework for the future growth and development of the unincorporated areas of the County. This document replaces the previous General Plan and is based on a set of guiding principles designed to protect the County's unique and diverse natural resources and maintain the character of its rural and semi-rural communities. It reflects an environmentally sustainable approach to planning that balances the need for adequate infrastructure, housing, and economic vitality, while maintaining and preserving each unique community within the County, agricultural areas, and extensive open space. Safety Element: Establishes policies and programs to protect the community from risks associated with seismic, geologic, flood, and wildfire hazards.
Capital Improvements Plan	Yes, 2021	The Capital Improvement Program consists of improvements to roads and bridges; facilities at the eight County-owned and operated airports and airstrips; flood control facilities in unincorporated developed areas; and wastewater facilities owned and operated by the County. These services keep our roads and related infrastructure up to date to promote safe, viable and livable communities and make it easier for community members to lead healthy lives. The Department of Public Works project management team is responsible for overall management and coordination of planning, budget, design, environmental clearance and permitting, right-of-way acquisition and utility coordination for County roads. Funds are approved by the Board of Supervisors though a yearly Detailed Work Program. In a typical fiscal year, approximately 30 projects are in construction with about 70 other projects in the development stages. The Capital Improvement Program anticipated budget for Fiscal Year 2020-21 is over $122 million.

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Local Emergency Operations Plan (EOP)	Yes, 2018	The Operational Area EOP is developed to be inclusive of multiple hazards, with a regional focus and template versions of the plan that local municipalities can develop into their own EOP. The County EOP includes annexes in the following relevant categories: • Emergency Management • Fire and Law Mutual Aid • Multi-Causality Operations • Public Health Operations • Terrorism
Continuity of Operations Plan	Yes, Updated Annually	The San Diego County Continuity of Operation plan (COOP) / Program is guided by the Chief Administrative Officer (CAO) COOP Policy of 2013 and identifies and tests redundant and inoperable systems for maintaining critical functions during disasters. There is a separate and specific annex of each plan for Pandemic. On an annual basis, each agency is required to submit and updated COOP and Site Evacuation Plan (SEP) to the County COOP Coordinator (OES Position) and this is submitted to a repository where each plan can be accessed by leadership within the county. Each plan is required to be tested every two years.
Transportation Plan	Yes, 2018	• Bicycle Transportation Plan • Pedestrian Area Transportation Plan • Active Transportation Plan
Stormwater Management Plan	Yes, 2018	On May 8, 2013, the San Diego Regional Water Quality Control Board (Regional Board) adopted a new Municipal Separate Storm Sewer System (MS4/Stormwater) Permit (National Pollution Discharge Elimination System Permit, No. R9-2013-0001) that covered the San Diego County Copermittees. Order No. R9-2015-0001 was adopted on February 11, 2015, amending the Regional MS4 Permit to extend coverage to the Orange County Copermittees. Order No. R9-2015-0100 was adopted on November 18, 2015, amending the Regional MS4 Permit to extend coverage to the Riverside County Copermittees and make minor revisions. This Permit mandates that the County of San Diego develop new and updated Runoff Management Plans and Programs, including Water Quality Improvement Plans and a Jurisdictional Runoff Management Program. These documents were submitted to the Regional Board on June 26, 2015. Permit requirements are generally implemented in the unincorporated County under authority of the Watershed

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
		Protection, Stormwater Management, and Discharge Control Ordinance (WPO). The amended MS4 Permit, like all previous iterations, requires the County to establish and maintain adequate legal authority to implement all updated MS4 Permit provisions. The WPO has been amended to ensure that it is current with the minimum requirements of the recently amended MS4 Permit. The amendments include updating terminology and definitions related to land development priority development projects (PDPs), removal of outdated sections, minor updates to discharge prohibitions, and the incorporation of an optional program to allow development projects to satisfy some of its stormwater compliance obligations at off-site locations. On January 27, 2016, the County Board of Supervisor's adopted the Watershed Protection, Stormwater Management, and Discharge Control Ordinance (WPO). The WPO became effective February 26, 2016.
Community Wildfire Protection Plan (CWPP) Community Wildfire Protection Plan (CWPP), continued	Yes, 2016-2020	Thirty-three communities have CWPP approved and in place: • Alpine • Crest • Camp & Lake Morena • Deer Springs • Descanso • Dulzura / Barrett • El Capitian • Eucalyptus Hills • Fallbrook • Greater Sunshine Summit • Harrison Park • Julian • Kensington X • Los Tules at Warner Springs • Mt. Laguna • Outer Jamul • Palomar Mountain • Pine Valley • Potrero – Tecate • Ramona • Rancho Penasquitos • Rancho Santa Fe • Real East County • Resource Conservation District of Greater San Diego County of San Diego

Plans	Yes/No Year	Does the plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
		• San Diego County Northeast • San Diego County Southwest • Scripps Ranch • Stoneridge at Warner Springs Estates • Talmadge • Valley Center • Vista Wynola Estates The International Fire Chiefs Association released their guide to help develop and implement a Community Wildfire Preparedness Plan in communities and across the country. It has a local community level approach to include code, development review, ordinances and local authority, and is used by leaders in the Fire Service, including subject matter experts, and local, state, and federal officials.
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Yes	• Disaster Recovery Plan • Climate Adaptation Plan • Wildfire Resiliency Strategy

Building Code, Permitting, and Inspections	Yes/N	Are codes adequately enforced?
Building Code	Yes	Yes
Site plan review requirements	Yes	Projects on lots that touch County or FEMA floodplain or floodways are routed to County Flood Control for review to ensure compliance with the County Flood Damage Prevention Ordinance which was last revised on 11/29/2019.
Land Use Planning and Ordinances	**Yes/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	Yes	Yes

Subdivision ordinance	Yes	Yes
Special purpose ordinances (floodplain management, storm water management, hillside or steep slope ordinances, wildfire ordinances, hazard setback requirements)	Yes	Projects on lots that touch County or FEMA floodplains or floodways are routed to County Flood Control for review to ensure compliance with the County Flood Damage Prevention Ordinance (FDPO) which was last revised on 11/29/2019. FDPO is an effective measure for reducing flood hazard impacts; and it is adequately administered and enforced.
Flood insurance rate maps	Yes	County's FDPO uses County floodplain and floodway maps available through SanGIS and FEMA FIRMs available through FEMA Map Service Center to effectively reduce flood hazard impacts. It is adequately administered and enforced.

4.1.2. ADMINISTRATIVE AND TECHNICAL

Administrative and Technical Capabilities include staff, their skills, and tools that can be used for mitigation planning and to implement specific mitigation actions.

For smaller jurisdictions without local staff resources, if there are public resources at the next higher-level government that can provide technical assistance, this may be indicated within the comments

Overall, this jurisdiction can expand upon these capabilities by seeking additional funding opportunities for applicable staff, research, projects, and applicable resources/expenses. This jurisdiction can also improve these capabilities by keeping an updated planning participant contact list to account for staff turnover and ensure the inclusion of staff belonging to diverse departments and with varied tools and skills to accomplish a comprehensive plan.

The following table summarizes the jurisdiction's administrative and technical capabilities:

TABLE 6: ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Administration	Yes/No	Describe capability Is coordination effective?
Planner(s) or engineer(s) with knowledge of land development and land management practices	Yes	Planning & Development Services (PDS)/ Lead Planner; County Fire CRR Battalion Chief
Engineer(s) or professional(s) trained in construction practices related to buildings and/or infrastructure	Yes	PDS/Building Inspectors; Fire Prevention Specialist I & II
Planners or Engineer(s) with an understanding of natural and/or human-caused hazards	Yes	County Fire Pre-Fire Division Chief
Mitigation Planning Committee	Yes	San Diego County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Planning Team
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	County drainage crews inspect and maintain public drainage facilities annually and perform maintenance as necessary to ensure optimal conveyance. Defer to Department of Public Works (DPW) Transportation for Roads right-of-way maintenance.
Mutual aid agreements	Yes	Mutual aid agreements with CPFD Region I and VI Mutual Aid Agreement are in place. This agreement extends the MHOAC program's mutual aid response from Region VI to include all of Region I. If the County of San Diego faces an issue that our Operational Area cannot get the necessary resources within our county or within Region VI, then all the resources within Region I will be made available for our operational area in accordance with the mutual aid agreement.
Staff	**Yes/No FT/PT1**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Floodplain Administrator	Yes	Staffing is adequate to enforce regulations. Staff are trained on hazards and mitigation. Staff are certified as Certified Floodplain Managers and regularly participate in continuing education provided by FEMA, ASFPM, FMA, etc. There is effective coordination between agencies and staff.
Emergency Manager Emergency Manager	Yes Yes	The Office of Emergency Services employed 8 Emergency Services Coordinators / Senior Emergency Services Coordinators, as well as Temporary Admin Analyst Positions to Assist. County Fire coordinates with County Fire Incident Management Teams. Emergency Medical Services Coordinator and (2) Emergency Medical Services Specialists, Senior Emergency Services Coordinator, PH/BT Quality Assurance Specialists are employed out of Health and

		Human Services. All the existing staff listed above are trained on local hazards and mitigation plans and have developed the relationships with outside agencies to have successful collaboration and support when needed.
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Public Health Services (PHS) has Health Planning and Program Specialists and Epidemiologists with technical assistance from the California Department of Public Health, Office of Health Equity, and other partners and subject matter experts to assess the community's vulnerability to hazards; The State has created assessments and health profiles for the various counties on vulnerability to the public health impacts of climate change. Staff referenced here do not enforce regulations. Staff referenced here are trained on the public health impacts of climate change and some also receive various levels of training in NIMS/ICS. More training is planned to occur in the coming years. There is good coordination and communication between the individuals and organizations referenced here. County Fire oversees the County Science Advisory Board; County Fire Environmental Scientists. The Hazard Incident Response Team are experts in Hazardous Waste spills / releases. Staff at the Office of Emergency Services are experts in all hazards and oversee the production of Concept of Operations (response plans and procedures) for a multitude of natural and human-caused disasters.

Community Planner	Yes	The following county departments recorded having Community planners on staff: • OES • PHS • DPW • PDS
Scientists familiar with the hazards of the community	Yes	The following county departments recorded having Scientists on staff: • OES • PHS • DPW • PDS
Personnel skilled in GIS and/or HAZUS	Yes	The following county departments recorded having GIS Personnel on staff: • OES • PHS • DPW • PDS

Grant writers	Yes	The following county departments recorded having Grant Writers on Staff: • OES • PHS • DPW • PDS

Technical	Yes/ No	Describe capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	The County and individual municipalities have multiple notification systems and protocols used during emergency events. AlertSanDiego is the opt-in notification system, WEA (Wireless Emergency Alert) is coordinated and used, as well as the SDEmergency App and website. • **Flood Warning** Flood Warning uses a network of automated rain, stream, reservoir and weather stations known as the ALERT Flood Warning System. Weather changes are reported in real-time to our Kearny Mesa office. ALERT systems are used around the world to provide real-time flood warning to local communities at risk from flooding threat. ALERT is an acronym that stands for Automatic Local Evaluation in Real-Time. • **San Diego Flood Warning System** The San Diego County Flood Warning System is made up of 120 rain gages, stream gages, weather stations, and lake level stations that report data in real time to the Flood Control Weather Center in Kearny Mesa. The system is internet-based and each of its sensors has defined alarms, that when activated, are used by the flood warning system to automatically assemble a warning message and send it out to the appropriate emergency managers by email or cell phone. The website has numerous links that allow the user to view and download the sensor data, view updating graphs and maps, and access other weather-related resources. • OES and PHS collaborate on Partner Relay to ensure messages are getting to community members with limited English proficiency. Additionally, Partner Relay hosts 3 workshops per year to warn community members and organizations serving populations without homes, refugees and other community-based organizations about emergency preparedness topics. Yes, this capability has been used to assess/mitigate

		risk in the past (e.g., during the Lilac Fire) and in between emergencies with the workshops for CBOs.
Hazard data and information	Yes	Hazard Data is used for both this plan, and the Counties Emergency Operations Plan. County OES also uses this data for our Concept of Operations and in assistance of hazard specific plans for other departments. HHSA and PHS have health statistics, and data about the social determinants of health (e.g., Live Well indicators). The Live Well Team and Community Health Statistics Unit maintain this data and information. Yes, this work has been used to assess and mitigate risk in the past both for the County and its partners by making this information widely and publicly available and promoting awareness of it (e.g., through workshops on the public health impacts of climate change, presentations on the Community Health Assessment data).
Grant writing	Yes	Mitigation grants (HMA / HMGP) Grants are applied for by multiple departments within the county (Flood Authority / OES / PDS). All of which have grant writing experience.
Hazus analysis	Yes	HAZUS Analysis is utilized for the Hazard Mitigation Plan.

4.1.3. FINANCIAL

Overall, this jurisdiction can expand upon this capability by researching, tracking, and applying for grant/funding opportunities that can enhance this jurisdiction's Hazard Mitigation Program and execution of Prioritized Actions outlined in Section 6 of this plan. This jurisdiction can also enhance this capability by dedicating staff and/or collaborating with existing finance staff to further develop this capability.

This jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation:

TABLE 7: FUNDING RESOURCES

Funding Resource	Access/ Eligibility (Yes/No)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Community Development Block Grants (CDBG)	Yes	
Capital improvements project funding	Yes	Yes
Authority to levy taxes for specific purposes	Potentially	San Diego Flood Control District Act provides potential, but Prop 218 requires a vote by property owners.
Fees for water, sewer, gas, or electric service	No	
Impact fees for homebuyers or developers for new developments/homes	Yes	Special Drainage Area Developer Fees provided to Flood Control District

4.1.4. EDUCATION AND OUTREACH

Overall, this jurisdiction can expand upon these capabilities by researching, tracking, and applying for grants/addition funding opportunities for applicable staff, research, education and outreach programs/projects/supplies/technology, and applicable resources/expenses. This jurisdiction can also enhance this capability by furthering it's creative use of outreach methods, such as leveraging the Partner Relay (comprised of community leaders), and expanding partnerships.

The table below Identifies education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information:

TABLE 8: EDUCATION AND OUTREACH PROGRAMS

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to permitted business on regulations only. Public Health Services (PHS) works with the following departments or groups for disaster resilience and mitigation: County OES, Community Action Partnership (Resident Leadership Academy, CinA, WalkNRoll, Exchange) & Office of Refugee Coordination, HHSA Regions, Integrative Services, Live Well San Diego team/CHWs, Partner Relay efforts with various community-based organizations serving refugees, populations without homes, and community groups with limited English proficiency. OES has a working group on access and functional needs, the County also has an Employee Resource Group called Diverse Abilities which takes an active interest in access and functional needs (AFN) populations and emergency preparedness. PHS also collaborates with a number of partners and community-based organizations on various activities (e.g., Vista Community Clinic). PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities.

Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to public schools on environmental education. Public Health Services (PHS) works with the following departments or groups on public information/education programs: County OES, CAP (RLA, CinA, Exchange) & Office of Refugee Coordination, HHSA Regions, DPW (Recycling and stormwater), DEH, AWM as well. Live Well San Diego team/Community Health Workers (CHW), Partner Relay (messages during and in between emergencies plus 3 educational workshops per year on emergency preparedness topics). Resident Leadership Academy (RLA) Network workshops on public health impacts of climate change. El Cajon Collaborative, East County, and all HHSA Regions to receive workshop on public health impacts of climate change (2021). PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities.
Natural disaster or safety related school programs	Yes	Public Health Services (PHS) works with the following departments or groups on natural disaster programs: County OES, CAP (potentially O'Farrell, RLA, NCRC), Live Well San Diego team/CHWs. PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities for natural disasters.
StormReady certification	Yes	Department of Environmental Health & Quality (DEHQ) does educational outreach to public schools on environmental education.
Firewise Communities certification	Yes	The National Weather Service Storm Ready Program was created to help communities develop disaster mitigation plans and prepare for extreme weather events. The National Weather Service has outlined five requirements to receive a storm ready certification (StormReady): Establish a 24-hour warning point and emergency operations center. Have more than one way to receive severe weather warnings and forecasts and to alert the public. Create a system that monitors weather conditions locally.

Firewise Communities certification	Yes	Promote the importance of public readiness through community seminars. Develop a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises. San Diego County Flood Control District's (SDCFCD) applied for a Storm Ready certification in 2018 and received it shortly afterward. SDCFCD's ALERT flood warning system has over 450 sensors continuously monitoring and transmitting hydrologic and weather information to the base station at the Kearny Mesa Weather Center. If any of the parameters exceed predetermined thresholds, alarm notifications are sent to emergency officials and flood control staff. This allows field crews and emergency staff to know where to concentrate storm cleanup or storm mitigation efforts. During precipitation events, Flood Control staff monitor weather conditions and ensure flood warning system integrity 24/7. Could the program/organization help implement future mitigation activities? The program's framework ensures communities frequently create or modify disaster mitigation plans to prepare for the increasing vulnerability of natural hazards. Flood Control holds and participates in exercises with partners to improve existing technology, ensure we utilize best communication practices, and make certain mitigation plans are relevant for current and future risks and hazards.
Public-private partnership initiatives addressing disaster-related issues	Yes	Public Health Services (PHS) works with the following departments or groups on public-private partnership initiatives: County OES, HHSA Regions, CAP & Office of Refugee Coordination, Live Well San Diego team/CHWs. Disaster Medical Surge Plan, San Diego Healthcare Disaster Coalition. PHS has the ability to collaborate with any of the groups listed above to help implement future mitigation activities to address disaster-related issues.

4.2. NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

As a participant in the National Flood Insurance Program (NFIP) (discussed previously in Section 1 of this plan), a community develops capabilities for conducting flood mitigation activities. The hazard mitigation plan must describe each jurisdiction's participation in the NFIP.

Participating communities must describe their continued compliance with NFIP requirements. The mitigation plan must do more than state that the community will continue to comply with the NFIP. Each jurisdiction must describe their floodplain management program and address how they will continue to comply with the NFIP requirements. The local floodplain administrator is often the primary source for this information.

Jurisdictions where FEMA has issued a floodplain map but are currently not participating in the NFIP may meet this requirement by describing the reasons why the community does not participate. Plan updates must meet the same requirements and document any change in floodplain management programs.

The County of San Diego participates in the NFIP. The following table shows the NFIP participation status of the County of San Diego and its jurisdictions:

TABLE 9: NFIP STATUS OF PARTICIPATING JURISDICTIONS.

Jurisdiction	Participating	Not Participating	Not Eligible
1. Alpine Fire Protection District			X
2. Carlsbad	X		
3. Chula Vista	X		
4. Coronado	X		
5. County of San Diego	X		
6. Del Mar	X		
7. El Cajon	X		
8. Encinitas	X		
9. Escondido	X		
10. Imperial Beach	X		
11. La Mesa	X		
12. Lemon Grove	X		
13. National City	X		
14. Oceanside	X		
15. Otay Water District			X
16. Padre Dam Municipal Water District			X
17. Poway	X		
18. Port of San Diego			X
19. Rainbow Municipal Water District			X
20. Rancho Santa Fe Fire Protection District			X

Jurisdiction	Participating	Not Participating	Not Eligible
21. San Diego (City)	X		
22. San Marcos	X		
23. San Diego County Water Authority			X
24. San Miguel Fire Protection District			X
25. Santee	X		
26. Solana Beach	X		
27. Sweetwater Authority			X
28. Vista	X		
29. Vista Irrigation District			X

The information listed below details this community's participation in and continued compliance with the NFIP and identified areas for improvement that could be potential mitigation actions (listed in Section 6 of this plan):

TABLE 10: LOCAL MITIGATION

NFIP Topic	Source of Information	Comments
Insurance Summary		
How many NFIP policies are in the community? What is the total premium and coverage?	State NFIP Coordinator or FEMA NFIP Specialist	1,119 policies $994,070 total premium $318,933,500 total coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	FEMA NFIP or Insurance Specialist	578 claims paid $5,510,145 total amount of paid claims NFIP does not track NFIP does not track substantial damage claims. San Diego County does not have any current records of substantial damage inspections and/or claims.
How many structures are exposed to flood risk within the community?	Community Floodplain Administrator (FPA)	There are approximately 2,268 insurable residential and non-residential structures within the mapped SFHA.
Describe any areas of flood risk with limited NFIP policy coverage.	Community FPA and FEMA Insurance Specialist	Additional time and resources would be needed to confirm or identify areas within the County where limited NFIP policy coverage may exist. For example, developed areas older than 30 years, areas that may be primary rental properties, and areas within the community that may represent low socioeconomic status.
Is the Community FPA or NFIP Coordinator certified?	Community FPA	No
Is floodplain management an auxiliary function?	Community FPA	Yes

NFIP Topic	Source of Information	Comments
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability).	Community FPA	The FPA administers the enforcement of adopted codes and regulations including NFIP compliance, stormwater, and floodplain management. The FPA is responsible for the management of FEMA's Community Rating System program and the administration of daily FPA duties: LOMC procedures, records of services provided to the public, outreach projects, SFHA permitting review, and review and maintenance of all documents associated with floodplain development. GIS mapping is a daily resource utilized by the FPA.
What are the barriers to running an effective NFIP program in the community, if any?	Community FPA	Funding opportunities to study and implement flood risk reduction projects and/or mitigation projects such as buyout/acquisition and demolition.
Compliance History		
Is the community in good standing with the NFIP?	State NFIP Coordinator, FEMA NFIP Specialist, community records	Yes, the community is in good standing with the NFIP.
Regulation		
When did the community enter the NFIP?	Community Status Book http://www.fema.gov/ national-flood-insurance-program/national-flood-insurance-program- community-status-book	6/15/1984
Are the FIRMs digital or paper?	Community FPA	Both. Current digital FIRMS are effective 3/22/2022.

NFIP Topic	Source of Information	Comments
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Community FPA	The State of California adopted and enforced statewide building codes in combination with the local floodplain regulations, exceed minimum NFIP requirements: • Minimum 1' freeboard including mechanic and equipment enforced for residential and non-residential development • Positive drainage from the foundation wall is enforced by the adopted building codes • New buildings on fill within the SFHA are required to be properly designed and on compacted fill per the adopted building codes
Provide an explanation of the permitting process.	Community FPA, State, FEMA NFIP Flood Insurance Manual http://www.fema.gov/ flood-insurance-manual Community FPA, FEMA CRS Coordinator, ISO representative	When a permit application is received, it is entered into Accela and identified to be within the floodplain by parcel data. During the review process, the FPA is involved in the plan review and permitting procedures. This includes plan review comments, discussions with the application and design professionals including the requirement of a finished construction elevation certificate prior to a certificate of occupancy being issued. The FPA works directly with Planning, Engineering, Public Works, and Building Inspections to ensure floodplain regulations are addressed during plan review and implemented/enforced up to the close of the building permit.

NFIP Topic	Source of Information	Comments
Provide an explanation of the permitting process.	Community FPA, State, FEMA NFIP Flood Insurance Manual http://www.fema.gov/ flood-insurance-manual Community FPA, FEMA CRS Coordinator, ISO representative	All SFHA projects are reviewed and permitted under current regulations including State-enforced, local regulations, and NFIP compliance as addressed in the floodplain management regulations.
Community Rating System (CRS)		
Does the community participate in CRS?	Community FPA, State, FEMA NFIP	Yes
What is the community's CRS Class Ranking?	Flood Insurance Manual http://www.fema.gov/ flood-insurance-manual	CRS Class 7, May 2023 publication CRS Class 6, October 2023 publication
Does the plan include CRS planning requirements	Community FPA, FEMA CRS Coordinator, ISO representative	Yes

SECTION FIVE: Risk Assessment



Decorative Image

Photo by County OES, Rob Andolina

San Diego County, California

2023

5. SECTION FIVE: CONDUCT A RISK ASSESSMENT

The Hazard Mitigation Planning Group (HMPG) conducts a risk assessment to determine the potential impacts of hazards to the people, economy, and built and natural environments of the community. The risk assessment provides the foundation for the rest of the mitigation planning process, which is focused on identifying and prioritizing actions to reduce risk to hazards.

In addition to informing the mitigation strategy, the risk assessment also can be used to establish emergency preparedness and response priorities, for land use and comprehensive planning, and for decision making by elected officials, city and county departments, businesses, and organizations in the community.

Risk Assessment requires the collection and analysis of hazard-related data to enable local jurisdictions to identify and prioritize appropriate mitigation actions that will reduce losses from potential hazards.

When the plan revision process began in 2019, 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. The HMPG also reassessed hazards that were not considered for mitigation actions in 2018 to determine if that decision was still applicable or if they should be moved to the active list. Finally, the HMPG 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.

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 hazard risk to the San Diego region. The HMPG reviewed all events since 2018 (wildfires, etc.) and all were profiled accurately in the original plan.

The review of other hazards showed 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.

Risk Assessment is the process of identifying the potential impacts of hazards that threaten an area, including both natural and human-caused events. A natural event causes a hazard when it harms people or property. Such events would include floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas. Human-caused 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 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 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.

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, then collecting and mapping hazard event profile information obtained from various federal, state, and local government agencies.

Building upon the original hazard profiles, The County Office of Emergency Services (County 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 hazard. The hazards assessed were both natural and human-caused.

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

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 also 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 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 within an area. It identifies the effects of natural and human-caused 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.

Disaster records were reviewed for repetitive losses. No repetitive losses were found for coastal storms, erosion, tsunamis, dam failures, earthquakes, landslides, wildfire, or liquefaction. Repetitive loss due to flooding is covered in the respective hazard profile of this plan.

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.

5.1. HAZARD ASSESSMENT SUMMARY

The Hazard Mitigation Planning Group (HMPG) 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 FEMA Local Mitigation Planning Handbook were also reviewed to determine if they should be added to the list of hazards to include in the plan revision. [84]

All hazards identified by FEMA included: avalanche, coastal storm, coastal erosion, dam failure, drought/water supply, earthquake, expansive soils, extreme heat, flooding, hailstorm, house/building fire,

[84] Local Mitigation Planning Handbook (fema.gov).

land subsidence, landslide, liquefaction, severe winter storm, tornado, tsunami, wildfire, windstorm, and volcano.

Although not required by the FEMA Disaster Mitigation Act of 2000, human-caused hazards, such as hazardous materials release, nuclear materials release, and terrorism, were also reviewed by the HMPG. Climate change was reviewed and discussed as an individual hazard. However, the HMPG determined the impact of climate change on the identified hazards should instead be included in hazard evaluations and their impacts.

Hazard identification is the process of identifying all hazards that threaten an area, including both natural and human-caused events. In the hazard identification stage, The HMPG 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 HMPG 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 2020 Unified San Diego County Emergency Services Organization Operational Area Emergency Plan, and the public.

The County Office of Emergency Services (County OES), with assistance of Geographic Information Systems (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 HMPG indicated that, because the majority of the development in San Diego is relatively recent (within the last 60 years), an urban-type 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 structure 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 also decided to incorporate nuclear materials release (resulting from an accident) under hazardous materials release.

The table below is the HMPG's summary of hazard description information and identification of hazards are most significant to the planning area:

TABLE 11: HAZARD IDENTIFICATION

Hazard	Location (Geographic Area Affected)	Maximum Probable Extent (Magnitude/Strength)	Probability of Future Events	Overall Significance Ranking
Avalanche	Negligible	Weak	Unlikely	Low
Dam Failure	Significant	Severe	Unlikely	Medium
Drought	Significant	Severe	Highly Likely	High
Earthquake/ Liquefaction	Significant	Extreme	Likely	High
Erosion	Limited	Moderate	Likely	High
Expansive Soils	Limited	Weak	Likely	Medium
Extreme Heat	Extensive	Severe	Highly Likely	High
Flood	Significant	Severe	Highly Likely	High
Hail	Limited	Weak	Unlikely	Low
Hurricane	Limited	Weak	Unlikely	Low
Rain-Induced Landslide	Extensive	Severe	Unlikely	Medium
Lightning	Significant	Weak	Unlikely	Low
Sea Level Rise/Coastal Storms	Negligible	Weak	Likely	High
Severe Wind	Extensive	Weak	Highly Likely	Medium
Severe Winter Weather	Significant	Moderate	Highly Likely	Medium
Subsidence	Negligible	Weak	Unlikely	Low
Tornado	Negligible	Weak	Unlikely	Low
Tsunami	Negligible	Weak	Unlikely	Medium
Wildfire	Extensive	Extreme	Highly Likely	High
Climate Change	Extensive	Extreme	Highly Likely	High
Terrorism / Cyber Terrorism (Human-Caused)	Extensive	Extreme	Likely	High
CBRNE Threats	Limited	Moderate	Occasional	Low
Pandemic Disease	Extensive	Extreme	Occasional	High

Definitions for Classifications Location (Geographic Area Affected)

- **Negligible:** Less than 10 percent of planning area or isolated single-point occurrences
- **Limited:** 10 to 25 percent of the planning area or limited single-point occurrences
- **Significant:** 25 to 75 percent of planning area or frequent single-point occurrences
- **Extensive:** 75 to 100 percent of planning area or consistent single-point occurrences

Maximum Probable Extent (Magnitude/Strength based on historic events or future probability)

- **Weak:** Limited classification on scientific scale, slow speed of onset or short duration of event, resulting in little to no damage
- **Moderate:** Moderate classification on scientific scale, moderate speed of onset or moderate duration of event, resulting in some damage and loss of services for days
- **Severe:** Severe classification on scientific scale, fast speed of onset or long duration of event, resulting in devastating damage and loss of services for weeks or months
- **Extreme:** Extreme classification on scientific scale, immediate onset, or extended duration of event, resulting in catastrophic damage and uninhabitable conditions Ft

TABLE 12: HAZARD SEVERITY

Hazard	Scale / Index	Weak	Moderate	Severe	Extreme
Drought[85]	Palmer Drought Severity Index3	-1.99 to +1.99	-2.00 to -2.99	-3.00 to -3.99	-4.00 and below
Earthquake[86] [87]	Modified Mercalli Scale 4	I to IV	V to VII	VII	IX to XII
	Richter Magnitude Scale 5	2, 3	4, 5	6	7, 8
Hurricane Wind[88]	Saffir-Simpson Hurricane Wind Scale 6	1	2	3	4, 5
Tornado [89]	Fujita Tornado Damage Scale7	F0	F1, F2	F3	F4, F5

Probability of Future Events

- **Unlikely:** Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.
- **Occasional:** 1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.
- **Likely:** 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
- **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.

Overall Significance

[85] Cumulative meteorological drought and wet conditions: http://ncdc.noaa.gov/

[86] Earthquake intensity and effect on population and structures: http://earthquake.usgs.gov

[87] Earthquake magnitude as a logarithmic scale, measured by a seismograph: http://earthquake.usgs.gov

[88] Hurricane rating based on sustained wind speed: http://nhc.noaa.gov

[89] Tornado rating based on wind speed and associated damage: http://spc.noaa.gov

- **Low:** Two or more criteria fall in lower classifications, or the event has a minimal impact on the planning area. This rating is sometimes used for hazards with a minimal or unknown record of occurrences or for hazards with minimal mitigation potential.
- **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

Based on this FEMA Standardized evaluation, in accordance with information covered within the HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public, the County of San Diego has prioritized the following hazards into High, Medium, and Low rankings (in no order of prioritization within individual categories):

High	**Medium**	**Low**
• Drought	• Dam Failure	• Avalanche
• Extreme Heat	• Expansive Soils	• Hail
• Flood	• Landslide	• Hurricane
• Sea Level Rise/Coastal Storms	• Severe Winter Weather	• Subsidence
• Erosion	• Tsunami	• Tornado
• Wildfire	• Severe Wind	• CBRNE Threats
• Climate Change		• Lightning
• Terrorism/Cyber-Terrorism		
• Pandemic Disease		
• Earthquake/Liquefaction		

A High ranking indicates the hazard has a "Highly Likely" probability of occurrence and/or a severe impact on the community. The Medium ranking indicated a "Likely" or "Occasional" potential for occurrence or impact. 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 "Unlikely" (remote and/or the impact of the event is minimal to the community).

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. Additionally, all jurisdictions rated wildfire High. The hazards selected by each jurisdiction and related mitigation goals and actions are included in Section 5 and 6 of their annexes.

The final list of twelve prioritized hazards for San Diego County were hazards with High or Medium Overall Significance. This list of prioritized hazards was determined by the HMPG using HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public (appearing below in alphabetical order):

- Climate Change
    - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
    - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Dam Failure
    - Probability of Future Events **Unlikely:** Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.

- Overall Significance **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- **Rationale for Inclusion: Determined to require inclusion by the HMPG using HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public**

- Drought
  - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
  - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Earthquake/Liquefaction
  - Probability of Future Events **Likely:** 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
  - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Extreme Heat
  - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
  - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Flood
  - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
  - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE Threats))
  - Probability of Future Events **Likely:** 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years
  - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.
- Rain-Induced Landslide
  - Probability of Future Events **Unlikely:** Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.
  - Overall Significance **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
  - **Rationale for Inclusion: Determined to require inclusion by the HMPG using HAZUS Data, Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public**
- Sea Level Rise/Coastal Storms/Erosion
  - Probability of Future Events **Likely:** 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years

    - Overall Significance **High**: The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- Severe Winter Weather
    - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
    - Overall Significance **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
- Tsunami
    - Probability of Future Events **Unlikely:** Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years.
    - Overall Significance **Medium:** The criteria fall mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.
    - **Rationale for Inclusion: Determined to require inclusion by the HMPG using HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public**
- Wildfire/Structure Fire
    - Probability of Future Events **Highly Likely:** 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year.
    - Overall Significance **High:** The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.

Climate Change will be addressed throughout this plan as both a hazard and a factor that could affect the location, extent, probability of occurrence, and magnitude of climate-related hazards listed above.

Though Pandemic Disease received a "High" Overall Significance rating (The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.), the HMPG determined this hazard's "Occasional" Probability of Future Events rating (1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.), and input from HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, Subject Matter Experts and the public did not necessitate this hazard to be included in this plan's final list of prioritized hazards.

5.1.1. HAZARD OMISSION RATIONALE

During the initial evaluation, the Hazard Mitigation Planning Group (HMPG) determined certain hazards were not included in the original plan's profiling step because they were not prevalent hazards within San Diego County, were found to pose only minor or very minor threats to San Diego County compared to the other hazards (status had not changed), and would, therefore, not be included in this revision.

Only hazards that received a High or Medium ranking in Section 5.1 (other than CBRNE threats due to their potentially serious impacts) were considered in this mitigation planning process.

Though Pandemic Disease received a "High" Overall Significance rating (The criteria consistently fall in the high classifications and the event is likely/highly likely to occur with severe strength over a significant to extensive portion of the planning area.), the HMPG determined this hazard's "Occasional" Probability of Future Events rating (1 to 10 percent probability of occurrence in the next year or a recurrence interval of 11 to 100 years.), and input from HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, Subject Matter Experts and the public did not necessitate this hazard to be included in this plan's final list of prioritized hazards.

The table below gives a brief description of remaining, omitted hazards and the reason for their exclusion:

TABLE 13: HAZARD OMISSION

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
Hail	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.
Subsidence	Occurs when large amounts of ground water have been withdrawn from certain types of 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.	Soils in the County are mostly granitic. Presents a minor threat to limited parts of the county. No historical record of this hazard in the region.
Lightning	Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms.	The US National Centers for Environmental Information reports that the County averages only three days of lightning a year, making it a minor threat compared to other hazards.
Tornado	A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm (or sometimes because 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.
Hurricane	Hurricanes, tropical storms, nor'easters and typhoons, also classified as cyclones, include any closed circulation developing around a low-pressure center in which the winds rotate counter-clockwise in the northern hemisphere (or clockwise in the Southern Hemisphere) and whose diameter averages 10 to 30 miles across. A tropical cyclone refers to any such	Prevailing winds take hurricane tracks westward off of Northern Baja and the few that may drift further north dissipate in the colder offshore waters and become rainmakers rather than causing destructive winds.

Hazard	Description	Reason for Exclusion
	circulation that develops over tropical waters.	
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.
Severe Wind	Severe wind is commonly associated with severe thunderstorm winds, severe winter storms (exceeding 58 mph) and tornadoes.	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.

5.1.2. 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 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.

5.2. ALL 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 was 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.

Because Nuclear Materials Release, Hazardous Materials Release, and Terrorism hazards are sensitive issues and release of information could pose further unnecessary threat, the HMPG decided that each of these hazards would be further profiled and assessed in a separate, “For Official Use Only” Appendix and would be exempt from public distribution and disclosure by Section 6254 (99) of the California Government Code *(Planning Partners, see separate FOUO Attachment A)*.

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 HMPG.

The final list of prioritized hazards to be profiled for San Diego County was determined as Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human Caused Hazards (Terrorism

& Hazardous Material Incidents (CBRNE Threats)), Rain-Induced Landslide, Sea Level Rise/ Coastal Storms/Erosion, Tsunami, and Wildfire.

A comprehensive list of hazards that are possible in San Diego County is detailed in the next subsection (in alphabetical order). Planning Partners should refer to the existing, For Official Use Only (FOUO) Threat and Hazard Identification Risk Assessment (THIRA) for hazard ranking information.

TABLE 14: HAZARD PROFILES

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
Climate Change	• National Climate Assessment • Scripps Institution of Oceanography • California Environmental Protection Agency and Office of Environmental Health Hazard Assessment	• Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century • In north San Diego County, there have been a number of significant cliff failures in recent years
Dam Failure	• FEMA-HAZUS • Dam Inundation Data (SanGIS) • San Diego County Water Authority (SDCWA) (Olivenhain Dam) • FEMA FIRM maps • Topography (SANDAG) • FEMA Hazards website	• Dam failure • 58 dams exist throughout San Diego County • Many dams over 30 years old • Increased downstream development
Drought	• California Department of Water Resources • San Diego County Water Authority	• Statewide multiple year droughts have occurred numerous times since 1976
Earthquake	• USGS • CGS • URS • CISN • SanGIS • SANDAG • FEMA-HAZUS 99 • FEMA Hazards website	• Several active fault zones pass through San Diego County
Liquefaction	• Soil-Slip Susceptibility (USGS) • FEMA-HAZUS MH • FEMA Hazards website	• 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.
Extreme Heat	• Spatial Hazard Events and Losses Database for the United States	• There have been 52 heat events in San Diego County since 2013
Flood	• FEMA FIRM Maps • Topography • Base flood elevations (FEMA) • Historical flood records	• Much of San Diego County is located within the 100-year floodplain

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
	• San Diego County Water Authority • San Diego County Dept. of Sanitation and Flood Control • FEMA Hazards website	• 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 1950-2019 for floods in San Diego County
Human-Caused Hazards: (Hazardous Materials Release)	• County of San Diego Dept. of Environmental Health, Hazardous Materials Division	• San Diego County has several facilities that handle or process hazardous materials • Heightened security concerns since September 2001
Human-Caused Hazards: (Nuclear Materials Release/CBRNE Threats)	• San Onofre Nuclear Generating Station (SONGS) and Department of Defense	• The potential exists for an accidental release of radioactive material stored at San Onofre or from nuclear ships in San Diego Bay • Heightened security concerns since September 2001
Human-Caused Hazards: (Terrorism/Cyber-Terrorism)	• County of San Diego Environmental Health Department Hazardous Materials Division	• The federal and state governments have advised every jurisdiction to consider the terrorism hazard • Heightened security concerns since September 2001
Rain-Induced Landslide	• USGS • CGS • Tan Map Series • Steep slope data (SANDAG) • Soil Series Data (SANDAG) • FEMA-HAZUS • FEMA Hazards website • NEH	• Steep slopes within earthquake zones characterize San Diego County, which creates landslide risk. • There have been two Proclaimed States of Emergency for landslides in San Diego County
Sea Level Rise/Coastal Storms/Erosion	• Historical Coastlines (NOAA) • Shoreline Erosion Assessment (SANDAG) • FEMA FIRM Maps • FEMA Hazards website • Coastal Zone Boundary (CALTRANS) • National Research Council's Report on Sea Level Rise in California, Oregon, and Washington: Past, Present and Future • Sea Level Rise Adaptation Strategy for the San Diego Bay	• Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century • Coastline stabilization measures have been implemented at various times in the past (erosion) • Extensive development along the coast
Severe Winter Weather	• NOAA National Centers for Environmental Information Storm Events Database	• Severe winter storms have caused damage in the County and can lead to immobility and loss of utilities.

Hazard	Data Collected for Hazard Identification	Justification for Inclusion
		Heavy rain can have significant impacts, including flash flooding and mudslides.
Tsunami	• 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) • National Research Council's Report on Sea Level Rise in California, Oregon and Washington: Past, Present and Future • Sea Level Rise Adaptation Strategy for the San Diego Bay	• Sea levels measured at a station in La Jolla have risen at a rate of 6 inches over the last century • Coastline stabilization measures have been implemented at various times in the past (erosion) • Extensive development along the coast
Wildfire	• CDF-FRAP • USFS • CDFG • Topography • Local Fire Agencies • Historical fire records • FEMA Hazards website	• San Diego County experiences wildfires on a regular basis • Twelve States of Emergency were declared for wildfires between 1950-2020 • Terrain and climate of San Diego • Santa Ana Winds

5.2.1. CLIMATE CHANGE

Nature of Hazard

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.

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.[90] The overwhelming majority of climate scientists agree that human activities, especially burning of fossil fuels, are responsible for most of the global warming observed.[91]

The Scripps Institution of Oceanography planning partners define Climate Change as any systematic change in the long-term statistics of climate elements and weather events (such as temperature, pressure, or winds) sustained over several decades or longer.[92] Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.

Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.[93]

Disaster History

More historical information, provided by Scripps Institution of Oceanography (University of California, San Diego), is detailed in the respective Vulnerability Assessment section of this plan.

Climate change impacts are already impacting the region especially as it relates to temperature and extreme heat. Recent weather and climate impacts provide a fingerprint of climate change impacts in San Diego County. These include terrestrial floods, coast sea level extremes, erosion and wave damage, heat waves, and wildfires, such as the 2003 and 2007 conflagrations. Compound extremes should be considered, such as the wildfire-followed-by flood and debris flow event that occurred in Montecito/Santa Barbara County in 2017.

Hazard Impacts

The most vulnerable populations to impacts from extreme events are those who inhabit locations with greatest or most unusual physical effects, those who lack resources, who are uninsured, who are socially isolated, or have already compromised health. Coastal regions are vulnerable to oceanic flooding and the increasing occurrence of heat waves, whose temperatures are likely lower than in inland regions but rarely occurred historically. However, the health impacts of less intense heat waves on those living in the coastal zone may be more severe than elsewhere in the county because the population is less acclimated to the heat. Neighborhoods with less access to air conditioning and natural shading from vegetation are more susceptible to extreme heat.

[90] 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.

[91] Ibid

[92] https://glossary.ametsoc.org/wiki/Climate_change

[93] https://www.ipcc.ch/sr15/chapter/glossary/

Implementing appropriate warnings and communication or extremes such as heatwaves and/or smoke from wildfires, and developing responses to prepare for these extremes is critically important, especially in the most vulnerable communities. To move forward, the region can assess current measures, such as cooling centers to take refuge from extreme heat, urban greening, residential and commercial structure fire resistance and community fire mitigation and escape routes.

Other ways to prevent and mitigate further impacts include:

- Testing and monitoring adaptation strategies. Such efforts include the Cardiff Dunes to mitigate coastal flooding.
- Identifying thresholds to determine when it may be necessary to relocate or redesign infrastructure.
- Continual improvement of extreme forecasts to allow longer lead times to prepare for the extremes.

The climate is projected to continue to change over this century and beyond. [94] 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. In general, to prepare and mitigate impacts of climate change, develop integrated multi-agency, multi-jurisdiction approach that uses best information, best practices, and considers the needs of under-resourced, disadvantaged communities and individuals.

Location & Extent/Probability of Occurrence & Magnitude

According to the Scripps Institution of Oceanography planning partners, Climate Change effects such as heat waves, wildfire, and floods will occur unevenly across San Diego County.

Climate change will occur throughout San Diego County, but the expression of climate change will differ across the complex landscape of the region depending on the type of event, e.g., heat, flooding, drought, or wildfire. Heat waves and wildfire will likely have greatest magnitude over inland regions, and runoff from heavy rainfall will be concentrated in stream channels.

Greenhouse gas mitigation remains important as observations, modeling, and physical principles show conclusively that the accumulation of anthropogenic greenhouse gasses in the atmosphere has driven the rapid warming observed globally over several decades (the last two decades in particular). Because:

- greenhouse gasses such as CO2 have long, several decade lifetimes
- the earth system is still not equilibrated (still warming) to the increased greenhouse gasses already resident in the atmosphere
- global society's fossil fuel (burns carbon, releases CO2) economy is difficult to replace so further accumulation of greenhouse gasses in the atmosphere is inevitable, the Earth's atmosphere, ocean, land, and ice will warm further.

Reducing greenhouse gas emissions is thus a critical immediate and long-range mitigation action (e.g., Franco et al., 2018).

The probability of Climate Change occurrence in the entire planning area is "Highly Likely", meaning 90 to 100 percent probability of occurrence in the next year or a recurrence interval of less than 1 year. Climate change is virtually certain to continue without immediate and effective global action. According to the National Aeronautics and Space Administration (NASA), the past eight years have collectively been the warmest years since modern recordkeeping began in 1880. Without significant

[94] 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.

global action to reduce greenhouse gas (GHG) emissions, the IPCC concludes in its Fifth Assessment Synthesis Report (2014) that average global temperatures are likely to exceed 1.5°C by the end of the 21st century, with consequences for people, assets, economies and ecosystems (including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges). [95]

5.2.2. DAM FAILURE

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.

Disaster History

Two major dam failures, during a single event, have been recorded in San Diego County. The Hatfield Flood of 1916 caused the failure of both the Sweetwater Main 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).

At the time of this plan's publication, there were not any reported dam failures in the planning area within the past five years.

Hazard Impacts

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Electric generating facilities and transmission lines could also be damaged and affect life support systems in communities outside the immediate hazard area. Associated water supply, water quality and health concerns could also be an issue. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

A major dam failure could have a devastating impact on the San Diego County Planning Area. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect crops and livestock as well as lifeline critical utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

Flooding, including that from dam failure, causes many impacts to agricultural production, including water contamination, damage to crops, loss of livestock, increased susceptibility of livestock to disease, flooded farm machinery, and environmental damage to and from agricultural chemicals.

Location & Extent/Probability of Occurrence & Magnitude

The figure below displays the locations 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:

[95] https://resources.ca.gov/Initiatives/Building-Climate-Resilience/2021-State-Adaptation-Strategy-Update

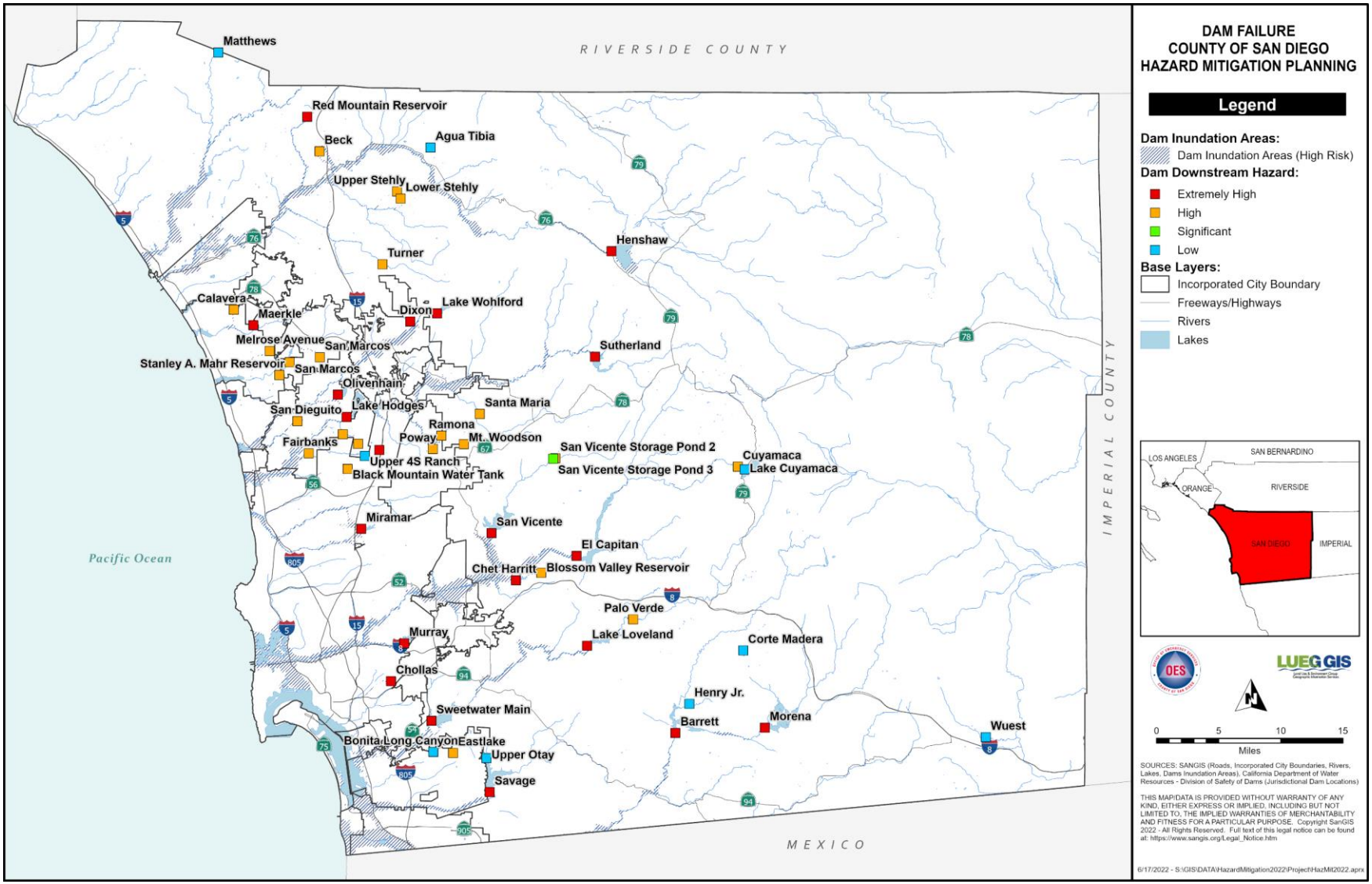


FIGURE 1: MAP OF SAN DIEGO COUNTY DAM INUNDATION AREAS

Dam inundation map data was used to profile dam failure risk levels. These maps were created by agencies that own and operate dams. The County Office of Emergency Services (County 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 County remains at risk to dam failures from numerous dams under a variety of ownership and control and of varying ages and conditions. Given the number, age and types of dams in San Diego County and the history of past uncontrolled releases of water from dams, the potential exists for future dam issues in the planning area. Though the probability of future occurrence of dam failure at mapped dam locations above is "Likely" to "Unlikely" (Less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years), the HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public determined this hazard's Overall Significance rating is "Medium", meaning the criteria falls mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

Climate Change Considerations

The most extreme events are going to become more extreme regarding climate change effects. These events are primarily atmospheric rivers and will become more so in the future based on global climate models (Gershunov et al., 2019). The increase in extreme precipitation will increase the risk of dam failure.

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include conducting dam safety and emergency spill operations.

5.2.3. DROUGHT

Nature of the Hazard

Drought is a slow-onset hazard that can last for months or years. As a hazard, it has the potential to impact many aspects of life, including drinking water and food. Because of the long duration of droughts, the impacts last for years and can ripple through a community over time. Severe droughts are projected for the coming decades and may increase incidences of other events, like wildfires. Drought will affect the viability of communities and the economy across the nation. [96]

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. [97] 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

[96] https://www.fema.gov/sites/default/files/2020-06/drought-planning-fact-sheet_10-4-16.pdf

[97] Ibid.

snowmelt, and earlier arrival of most of the year's streamflow.[98] 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.[99] In fact, studies indicate that San Diego's sources of water could shrink by 20 percent or more by 2050.[100] An additional threat to water supply is the vulnerability of the levees protecting the California Delta, which feeds the State Water Project.[101] According to the California Adaptation Planning Guide, jurisdictions in the San Diego region must carefully consider the vulnerability of their water supply.[102]

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.

Disaster History

The depression era 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 considered banning outdoor water use. The rains of "Miracle March" in 1991 replenished rivers, reservoirs, and the Sierra snowpack.

A drought occurred in 2007 and lasted until 2011. Then, another drought began in 2012 just ended in 2017, following a series of winter storms that brought heavy rainfall to the state. The proclamation was extended again on July 8, 2021, amid deepening drought and record-breaking temperatures. The Governor requested Californians to voluntarily reduce water use by 15% to protect water reserves if drought conditions continue.

On April 21, 2021, California Governor Newsom, proclaimed a drought emergency, which enables state response to water supply shortfalls where conditions are extremely dry. This drought emergency proclamation was expanded to include new counties on May 10, 2021. By October 19, 2021, the Governor expanded the drought emergency proclamation to include San Diego County and seven other counties, which were the last of the 58 California counties to be included in the drought emergency proclamation.

On March 28, 2022, the Governor prompted local water suppliers, at the local level, to move to Level 2 of their Water Shortage Contingency Plans, which "requires locally appropriate actions that will conserve water across all sectors, and he directed the State Water Resources Control Board to consider a ban decorative watering at businesses and institutions.[103] Although key improvements have been made since 2016, California is still experiencing drought conditions.

Hazard Impacts

As extreme drought periods become more frequent, the increase in slow, or chronic drought periods can cause long term and indirect health effects on people. Potential health effects include "compromised quantity and quality of drinking water, increased recreational risks, effects on air quality, diminished living conditions related to energy, air quality, and sanitation and hygiene, mental health effects related to economic and job losses, compromised food and nutrition and increased incidence of illness and disease" (Centers for Disease Control, 2022).

[98] 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.

[99] California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

[100] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

[101] California Adaptation Planning Guide, Understanding Regional Characteristics (2012)

[102] Ibid.

[103] https://drought.ca.gov/state-drought-response/

Severe droughts are projected for the coming decades and may increase incidences of other events like wildfires, which are threats to people, structures, and other community assets.

Areas in unincorporated San Diego County that are dependent on groundwater resources for potable and non-potable water supplies often receive water from small water systems or domestic wells. While these areas are located outside of San Diego County Water Authority's service area and do not have access to imported water, there is still the potential risk of drought and water shortage resulting in reduced capacity and/or dry wells.

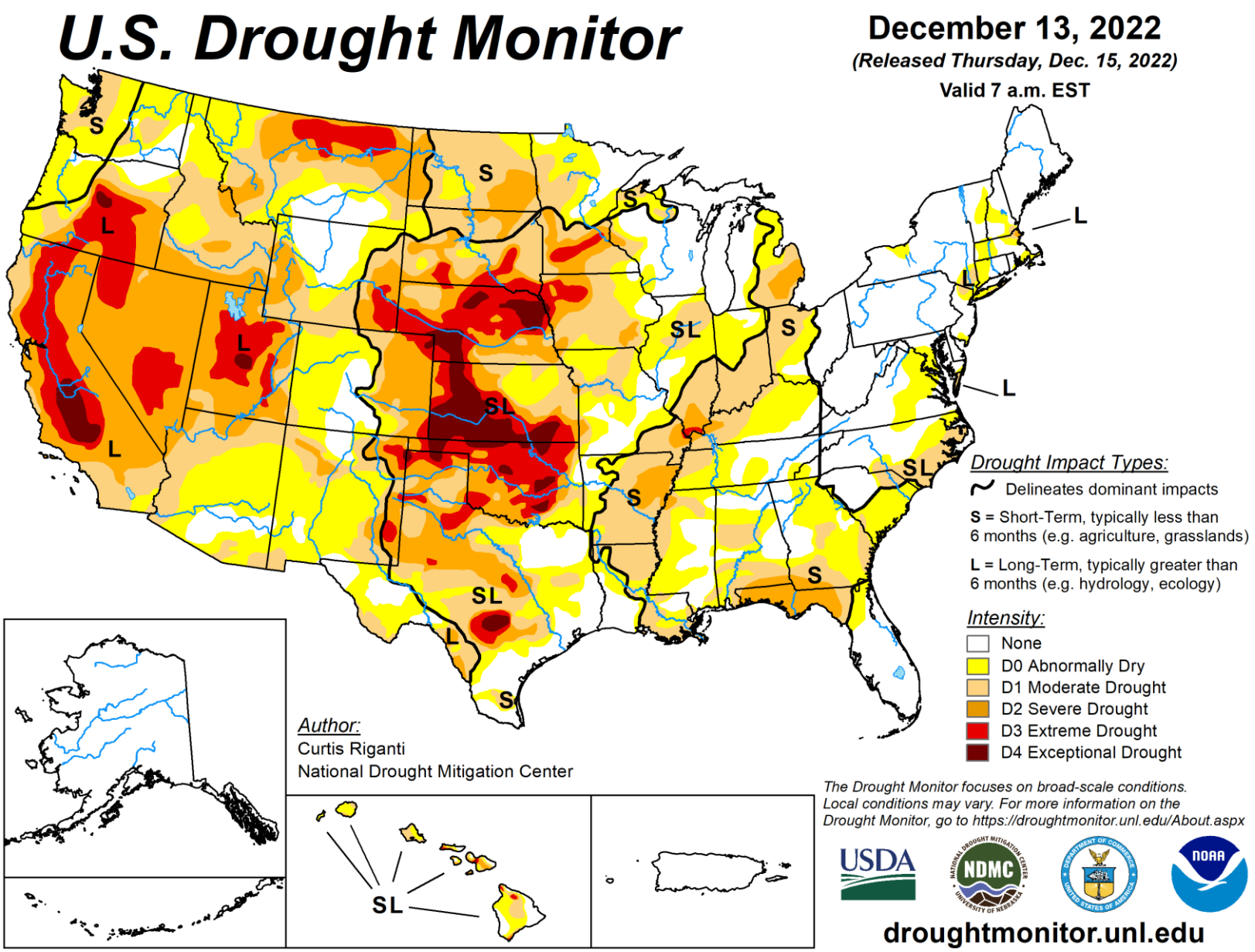
To facilitate drought and water shortage preparedness for state small water systems and domestic wells, County Planning & Development Services in collaboration with County Department of Environmental Health and Quality provides an opportunity for communicating and maintains a list of resources to assist residents and communities facing a risk of water shortage. Drought resources can be found at: https://www.sandiegocounty.gov/pds/SGMA.html.

Location & Extent/Probability of Occurrence & Magnitude

In an arid region such as San Diego County, the probability of recurring droughts with severity is "Highly Likely".

Historical drought data for the County Planning Area and San Diego County indicate there have been five significant multi-year droughts over the last 93 years. This equates to a multi-year drought every 18.6 years on average, or a 5.4% chance of a drought in any given year. Based on this data, droughts will likely affect the Planning Area. Given the historical occurrence of severe drought impacts throughout San Diego County and across the State, drought is expected to continue to pose a high degree of risk to the entire Planning Area, potentially impacting crops, livestock, water resources, the natural environment at large, buildings and infrastructure (from cascading or compound hazards), and local economies.

A U.S. Drought Monitor, using the Palmer Drought Severity Index, can be found below and at http://droughtmonitor.unl.edu/:


U.S. Drought Monitor
December 13, 2022
(Released Thursday, Dec. 15, 2022)
Valid 7 a.m. EST
Drought Impact Types:
Delineates dominant impacts
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)
Intensity:
None
D0 Abnormally Dry
D1 Moderate Drought
D2 Severe Drought
D3 Extreme Drought
D4 Exceptional Drought
Author:
Curtis Riganti
National Drought Mitigation Center
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx
USDA
NDMC
NOAA
droughtmonitor.unl.edu

Climate Change Considerations

Although there is a lot of variability, projections indicate that there will be longer and more frequent drought that will be punctuated by extreme precipitation. The evaporative demand (atmospheric thirst) is an important component in driving the extent of future droughts (McEvoy et al, 2020).

Drought can increase wildfire risk and lead to fine fuel regrowth after a fire. This type of vegetation is more susceptible to fires, creating a feedback cycle.

Extreme drought has the potential to intensify and change community composition and structure of ecosystems. Drought has severe consequences because it operates at spatial scales larger than other disturbances such as fire (Jennings et al., 2018).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include water supply reliability that originates from a diversity of water supplies and conservation planning that addresses the impacts of drought on ecosystems.

5.2.4. EARTHQUAKE

Nature of the 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 X 10) more powerful than a M5 earthquake and releases 1,024 times (32 X 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, as displayed in the table below:

TABLE 15: MODIFIED MERCALLI 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.

MMI Value	Description of Shaking Severity	Summary Damage Description Used on 1995 Maps	Full Description
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.

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.

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 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).

Disaster History

Historic documents record a very strong earthquake struck San Diego on May 27, 1862; damaging buildings in Old Town and opening 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).

At the time of this plan's publication, there were not any significant earthquakes in the planning area within the past five years.

Hazard Impacts

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. After a major seismic event it is possible that San Diego County could experience damage to transportation infrastructure, that would disrupt the flow of goods and services. A majority of the community members within the County are potentially exposed to the direct and indirect impacts of a major earthquake. Indirect impacts can include but are not limited to, business interruptions, road closures, loss of utilities, and transportation disruptions. Direct impacts can include, but are not limited to, minor or major structure damage, downed trees, and injury or loss of life.

Environmental problems can result as a secondary hazard after a major earthquake. Earthquake induced landslides could cause damage to the surrounding habitat, and water quality can be affected if moving earth comes in contact with a water source. Facilities holding hazardous materials are of particular concern. During a major earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment.

Location & Extent/Probability of Occurrence & Magnitude

The figures below display the location and extent of the profiled earthquake hazard areas for San Diego County:

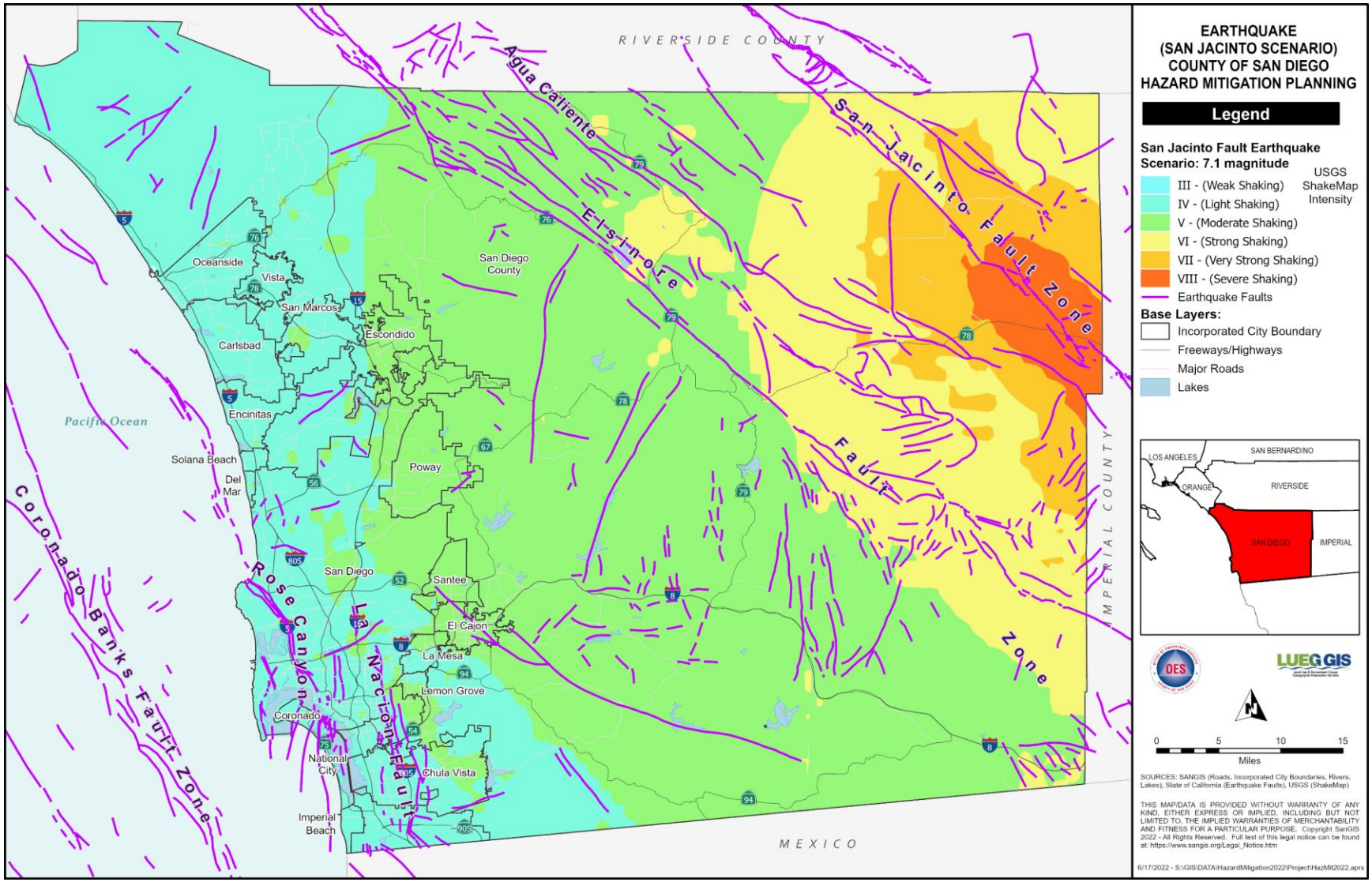


FIGURE 2: MAP OF SAN DIEGO COUNTY SAN JACINTO FAULT EARTHQUAKE SCENARIO

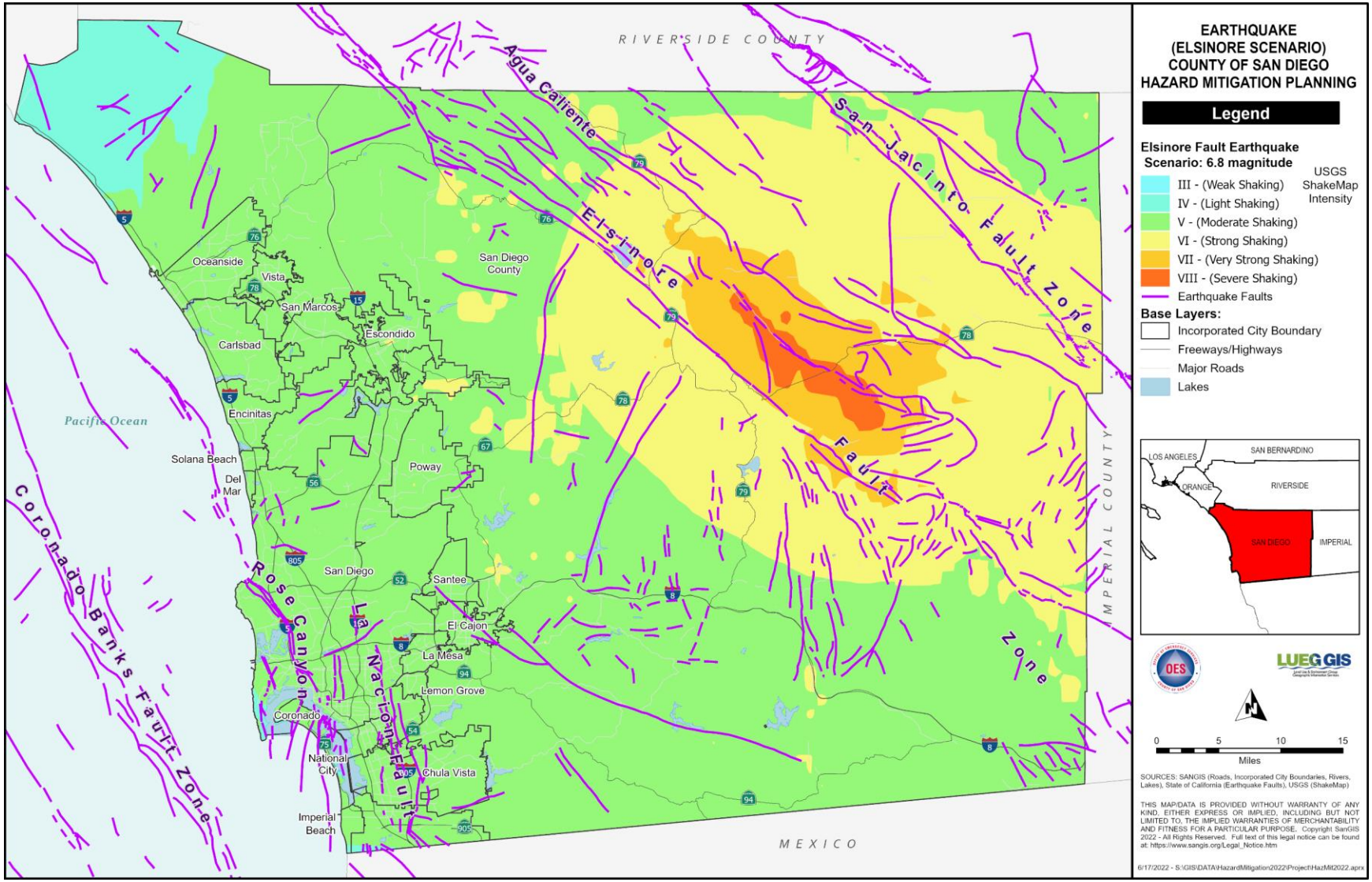


FIGURE 3: MAP OF SAN DIEGO COUNTY ELSINORE FAULT EARTHQUAKE SCENARIO

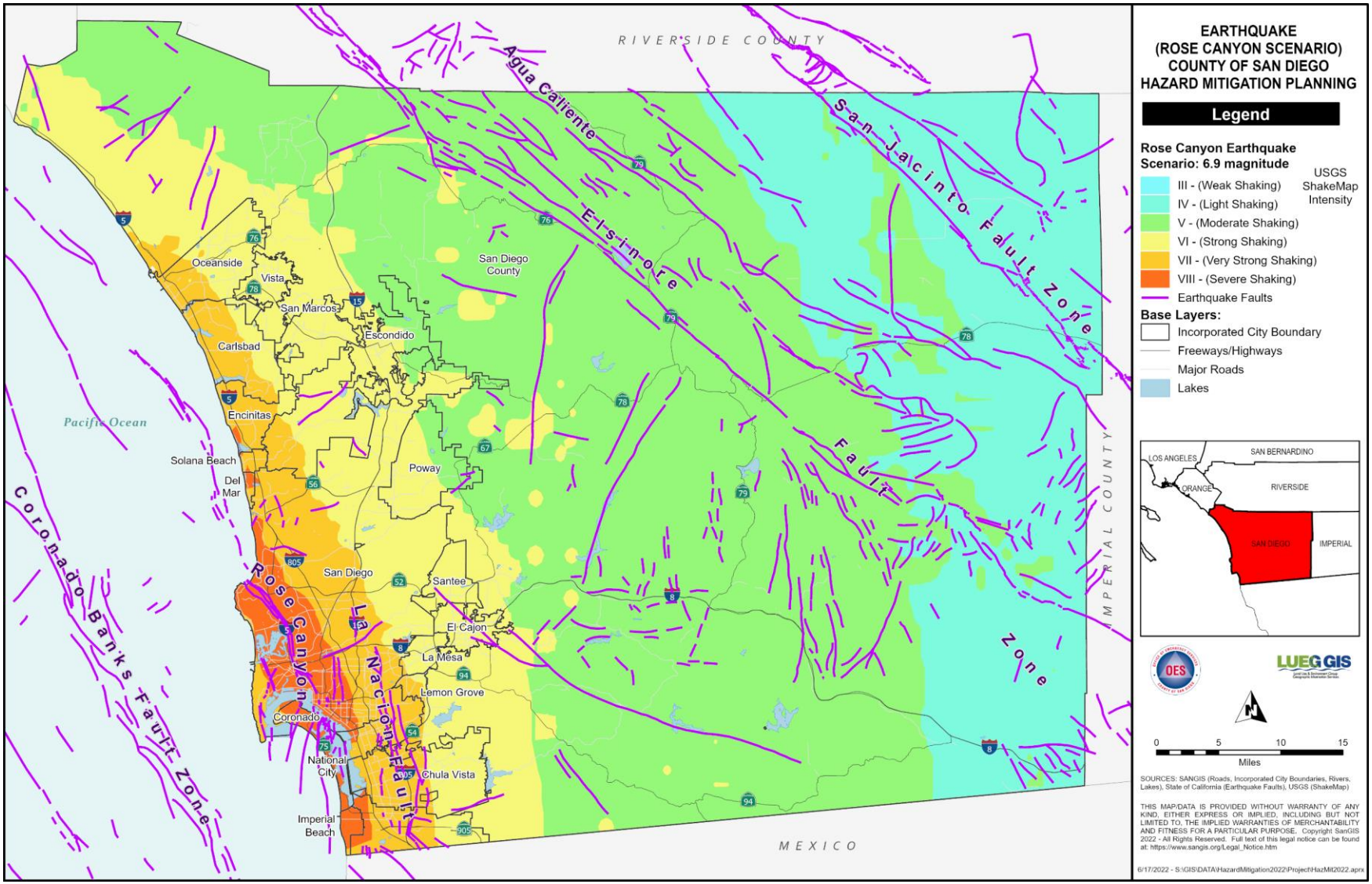


FIGURE 4: MAP OF SAN DIEGO COUNTY ROSE CANYON FAULT EARTHQUAKE SCENARIO

This is based on a United States Geological Survey (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).

Data used to profile earthquake hazard included probabilistic PGA data from USGS and a Scenario Earthquake Shake map for Rose Canyon from the California Integrated Seismic Network (CISN). From these data, the Hazard Mitigation Planning Group (HMPG) 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.

It is estimated that major earthquakes (ranging from a magnitude of 7 to 7.9) occur in California one out of every 10 years. However, strong earthquakes (from magnitudes 6 to 6.9) strike the State about once every two to three years. A strong earthquake can cause major damage depending on the epicenter's location with regards to populated areas, and can lead to billions of dollars in disasters, deaths, injuries, and disruptions in services and communities' way of life. The United States Geological Survey estimates a 75% probability of one or more magnitude 7.0 earthquakes striking Southern California over a 30-year period. The probability of an earthquake in the San Diego region is considered somewhat "Likely", meaning 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Climate Change Considerations

Not applicable.

5.2.5. EXTREME HEAT

Nature of the Hazard

In most of the United States, including the entire planning area, extreme heat is a long period (2 to 3 days) of high heat and humidity with temperatures above 90 degrees.[105] 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.[106]

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.[107] However, the California State Hazard Mitigation Plan considers extreme heat a legitimate disaster type.[108]

[105] https://community.fema.gov/ProtectiveActions/s/article/Extreme-Heat

[106] 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.

[107] Klinenberg, Eric. *Heat Wave: A Social Autopsy of Disaster in Chicago*, The University of Chicago, 2002

[108] Governor's Office of Emergency Services (2013) California Multi-Hazard Mitigation Plan

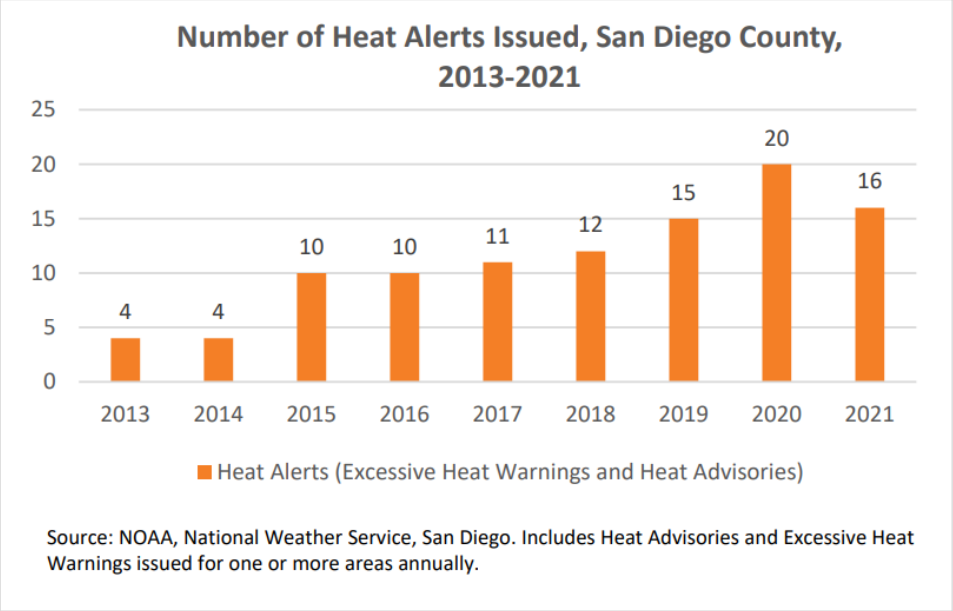
Disaster History

Following the events of 2006, when there was a prolonged period of extreme heat across the state of California, San Diego County developed an Excessive Heat Preparedness and Response Plan. [109]

According to weather.gov's "A History of Significant Weather Events in Southern California Organized by Weather Type", there have been nine Extreme Heat events between October 2017 and September 2022.[110] During the first week of September 2020 "a major heat wave struck the region that in some ways and for some areas was unprecedented... Climate stations in El Cajon, Alpine and Escondido achieved their all-time highest temperatures on record for any day on 9.6".[111]

According to NOAA's National Centers for Environmental Information (NCEI), Storm Events Database, between October 2017 and December 2022, Excessive Heat events occurred over a total of 36 days and resulted in 52 injuries and 2 deaths.[112]

According to the County of San Diego Health and Human Services Agency, Public Health Services, "2021 Excessive Heat Response Plan Summary", over the past nine years, the combined number of heat advisories and excessive heat warnings has generally increased, from 2013 through 2021. The highest numbers of Heat Alerts were issued in 2020 (20 [events]) and 2021 (16 [events]).[113]



Source: NOAA, National Weather Service, San Diego. Includes Heat Advisories and Excessive Heat Warnings issued for one or more areas annually.

Hazard Impacts

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. San Diego County has among the highest percentages of impervious surfaces in the states,

[109] 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.

[110] https://www.weather.gov/media/sgx/documents/weatherhistory.pdf

[111] https://www.weather.gov/media/sgx/documents/weatherhistory.pdf

[112] https://www.ncdc.noaa.gov/stormevents/listevents.jsp?eventType=%28Z%29+Excessive+Heat&beginDate_mm=10&beginDate_dd=01&beginDate_yyyy=2017&endDate_mm=11&endDate_dd=30&endDate_yyyy=2022&county=SAN%2BDIEGO%3A73&hailfilter=0.00&tornfilter=0&windfilter=000&sort=DT&submitbutton=Search&statefips=6%2CCALIFORNIA

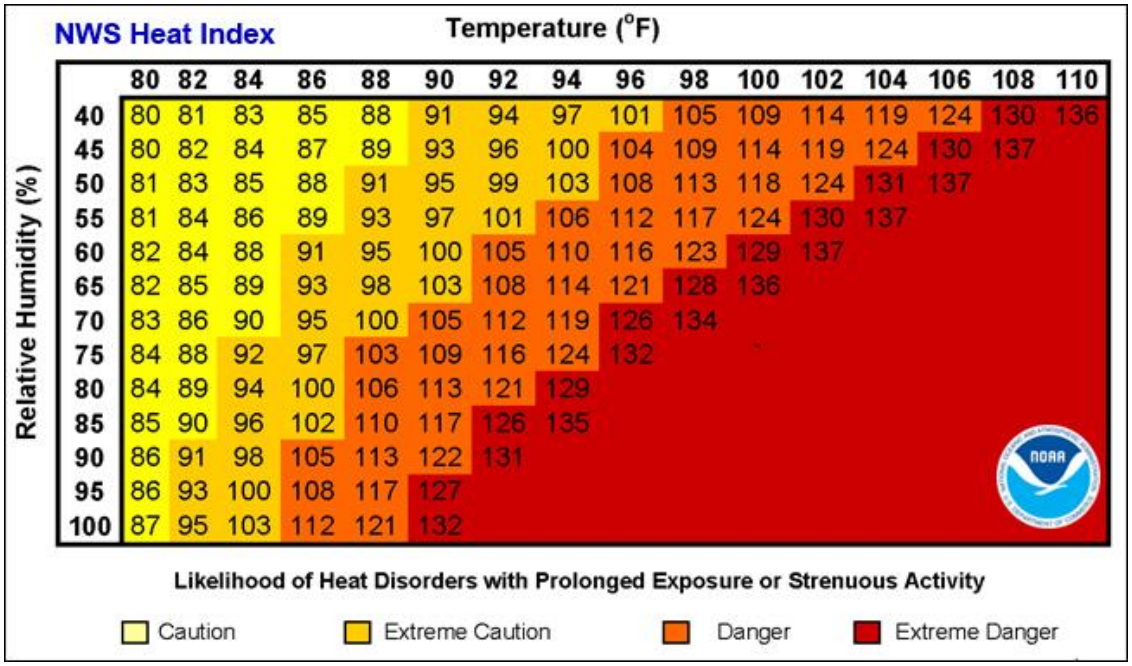
[113] https://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/ExtremeHeat/2021%20Annual%20Excessive%20Heat%20Report%20-%20FINAL.pdf

increasing the potential impacts of heat islands. In fact, Southern California's urban centers are warming more rapidly than other parts of the state.

Extreme heat events put vulnerable populations (such as older adults, children, people who are 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. For example, socially isolated older adults are especially vulnerable. People who live in urban areas with high impervious surface coverage and no access to air conditioning are also especially vulnerable.

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 dangerous. Hotter temperatures may also lead to poorer air quality because ozone formation, a component of smog, increases with higher temperatures.

The National Weather Service uses the heat index to illustrate what temperature feels like to the human body when relative humidity is combined with the air temperature, which is important for the human body's comfort level:



There is direct relationship between the air temperature and relative humidity and the heat index, meaning as the air temperature and relative humidity increase (decrease), the heat index increases (decreases). to determine the heat index using the chart above, you need to know the air temperature and the relative humidity. For example, if the air temperature is 100°F and the relative humidity is 55%, the heat index will be 124°F. When the relative humidity is low, the apparent temperature can actually be lower than the air temperature. It is important to note the heat index values in the chart above are for shady locations. If a person is exposed to direct sunlight, the heat index value can be increased by up to 15°F. As shown in the table below, heat indices meeting or exceeding 103°F can lead to dangerous heat disorders with prolonged exposure and/or physical activity in the heat:[114]

[114] https://www.weather.gov/ama/heatindex

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

Location & Extent/Probability of Occurrence & Magnitude

The entire planning area 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, community members 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.[115] 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.[116]

Over the past 15 years, the region has seen increasing temperatures, evidenced by an increased number of excessive Heat Alerts, which are initiated based on heat advisory and excessive heat warnings. Heat Alerts generally occur from May to September. From 2013 to 2021, 98 Heat Alerts were issued in the County of San Diego. This means that there is a 3% chance on any given day of an excessive Heat Alert occurring over the course of a year, which ranks future event of this hazard as "Highly Likely" to occur. The highest numbers of Heat Alerts were issued in 2020 (20) and 2021 (16). In 2021, the County of San Diego had 8 heat events, ranging from 2 to 8 days long, lasting a total of 36 days.

National data on extreme heat can be found through Climate Data Online (CDO) at **https://www.ncei.noaa.gov/cdo-web/**.

Climate Change Considerations

An increase in the intensity, frequency and duration of extreme heat events is expected in the context of climate change. Furthermore, observations have shown, and projections indicate, that the flavor of extreme

[115] Gershunov, A., and K. Guirguis (2012), California heat waves in the present and future, Geophysical Research Letters., 39, L18710

[116] 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.

heat events have and will continue to change with more and more humid heat events (that drive nighttime heat events) (Gershunov et al., 2009, Gershunov et al., 2012).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include preparation, with strong attention to weather forecasts and ready social services, infrastructure (e.g. Cooling Centers), and programs to support installation of air conditioning units in communities lacking access.

5.2.6. FLOOD

Nature of the 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 injuries and deaths from flood occur when people are swept away by flood currents, and property damage typically occurs as a result of inundation by sediment-filled water.

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.

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).

The table below displays a history of flooding in San Diego County, as well as loss associated with each flood event:

TABLE 16: HISTORY RECORDS OF LARGE FLOODS IN SAN DIEGO COUNTY

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
1987	$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

Date	Loss Estimation	Source of Estimate	Comments
Dec 2018	$75,000 (estimated)	NOAA's National Centers for Environmental Information (NCEI), Storm Events Database	Heavy rain resulted in flooding near the Shoppes at Carlsbad. Five businesses reported flooding damage. A roof collapsed at a childcare center in the shopping center. The Alpha Project Bridge Shelter in East Village San Diego closed for a week due to flooding from the heavy rain.
Feb 2019	$340,000 (estimated)	NOAA's National Centers for Environmental Information (NCEI), Storm Events Database	Flooding occurred in Ramona with up to 2 feet of standing water. Severe damage to portions of highway 78 and 79 along the shoulder of the road. Extensive flooding on San Diego River in Mission Valley including Fashion Valley mall. San Diego River reached 12.1 feet which is above flood stage. A total of 5 to 10 inches of rain occurred on the Palomar mountain coastal slopes in 12 hours. This lead to flash flooding in Pala with road damage and swift water rescues. Intestate 8 was closed for 12 hours due to snow covered and icy roads. Numerous accidents including at Willows road at 2,600 feet.

Date	Loss Estimation	Source of Estimate	Comments
Nov – Dec 2019	$125,000 (Estimated)	NOAA's National Centers for Environmental Information (NCEI), Storm Events Database	12 San Diego State University dorm rooms flooded. Numerous cars piled up in an RV park in La Mesa due to flash flooding.
April 2020	$2,420,000 (Estimated)	NOAA's National Centers for Environmental Information (NCEI), Storm Events Database	Interstate 8 landslide and debris on highway caused closure. City of Oceanside had significant damage to the wastewater treatment plant. Estimated up to 2 million gallons spilled as the plant was inundated by the flash flooding of Buena Vista Creek. Twenty persons evacuated from a nursing home.

As of 12/31/2022 there have been no additional significant flooding events in the planning area.

Hazard Impacts

The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment.

Although jurisdictions can implement mitigation and take preventative actions to significantly reduce the severity and threat of flood events, some type of risk will always exist (i.e., risk of a hazard event occurring despite mitigation measures applied to reduce/prevent it). Threats associated with flood risk include failure of a reservoir, a dam breach, or other infrastructure failure, or a severe flood event that exceeds flood design standards or drainage capacity.

Location & Extent/Probability of Occurrence & 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 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 community members and over 200,000 acres of flood-prone property. Seven principal 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).

The figure below displays the location and extent of flood hazard areas for the County of San Diego:

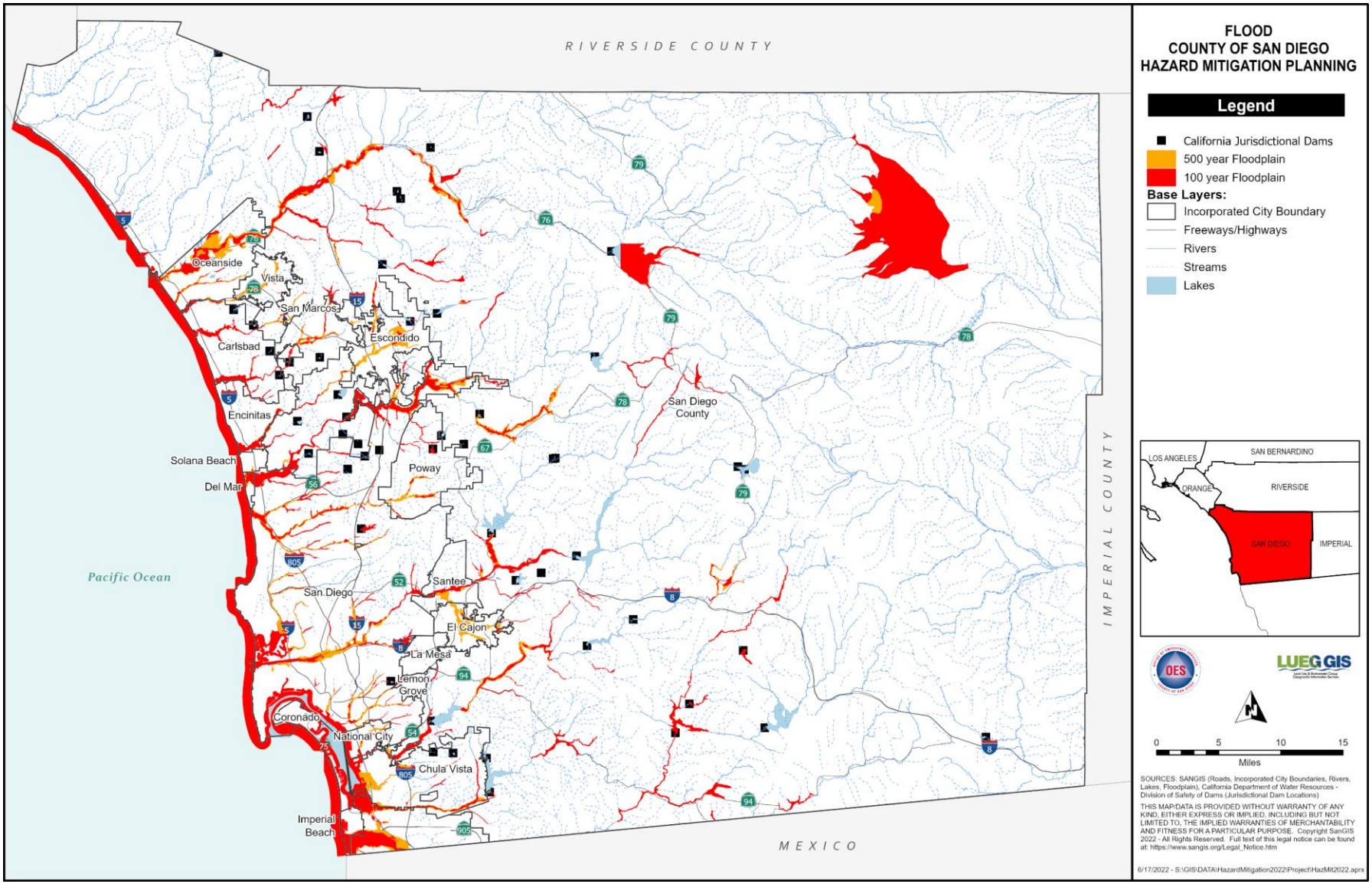


Figure 5: Map Of San Diego County 100-Year And 500-Year Floodplains

As shown, 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.

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced any of the following since 1978, regardless of any changes in ownership:

- Four or more paid losses more than $1,000
- Two paid losses more than $1,000 within any rolling 10-year period
- Three or more paid losses that equal or exceed the current value of the insured property.

The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. Studies have found that many of these properties are outside any mapped 1 percent annual chance floodplain. The key identifiers for repetitive loss properties are the existence of NFIP insurance policies and claims paid by the policies.

FEMA further designates as severe repetitive loss any NFIP-insured single-family or multi-family residential building for which either of the following is true:

- The building has incurred flood-related damage for which four or more separate claims payments have been made, with the amount of each claim (including building and contents payments) exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000
- At least two separate claims payments (building payments only) have been made under NFIP coverage, with the cumulative amount of claims exceeding the market value of the building.

To quality as a severe repetitive loss property, at least two of the claims must be within 10 years of each other, and claims made within 10 days of each other are counted as one claim. In determining SRL status, FEMA considers the loss history since 1978, or from the building's construction if it was built after 1978, regardless of any changes in the ownership of the building.

FEMA-sponsored programs, such as the Community Rating System (CRS), require participating communities to identify repetitive loss areas. A repetitive loss area is the portion of a floodplain holding structures that FEMA has identified as meeting the definition of repetitive loss. Identifying repetitive loss areas helps to identify structures that area at risk but are not on FEMA's list of repetitive loss structures because no flood insurance policy was in force at the time of loss.

Based on the 2022 FEMA Repetitive Loss Summary Report, there have been numerous repetitive and severe repetitive losses in San Diego County. These losses are provided in the table below:

TABLE 17: REPETITIVE LOSS PROPERTIES DUE TO FLOODS IN SAN DIEGO COUNTY

Jurisdiction	Repetitive Loss Properties	Structure Type	Severe Repetitive Loss Properties	Structure Type	Total Number Mitigated
Carlsbad	1	Nonresidential	0	---	0
Del Mar	15	Residential	0	---	0
Escondido	4	Residential	1	Residential	0
Lemon Grove	0	---	0	---	0
Poway	9	Residential	2	Residential	1
Santee	1	Nonresidential	0	---	0
County of San Diego	20	Nonresidential (4) Residential (15) Commercial (1)	3	Residential (2) Commercial (1)	7
Chula Vista	1	Residential	0	---	0
El Cajon	4	Residential	1	Residential	0
Imperial Beach	4	Residential	0	---	0
National City	3	Nonresidential (2) Commercial (1)	0	---	0
San Diego	47	Nonresidential (11) Residential (27) Commercial (9)	4	Nonresidential (1) Residential (1) Commercial (2)	0
Solana Beach	7	Residential	3	Residential	0
Coronado	1	Residential	0	---	0
Encinitas	2	Residential	0	---	0
La Mesa	2	Residential	0	---	0
Oceanside	13	Nonresidential (5) Residential (6) Commercial (2)	0	---	6
San Marcos	1	Residential	0	---	0
Vista	3	Nonresidential (1) Residential (2)	1	Residential	0
Total	138	---	15	---	14

Due to the history of past flooding events and the natural drainage pattern of the Planning Area, flooding in the County of San Diego is "Highly Likely" to continue to occur. According to the NCEI Storm Events Database, there have been 144 flood events recorded for the County of San Diego between 1997 and 2021. This means there is a 2% chance on any given day of a flood event occurring over the course of a year. The County of San Diego has experienced at least one flooding event every year since 2010. Over the past decade, major floods have occurred in Mission Valley, El Cajon, Ramona, and Borrego Springs. In addition to these major flood events, flooding has been known to occur in localized areas of the County during average seasonal rainstorms.

Climate Change Considerations

The most extreme events are going to become more extreme regarding climate change effects. These events are primarily atmospheric rivers and will become more so in the future based on global climate models (Gershunov et al., 2019). In addition, the increase in sea level increases the potential for severe flooding caused by the occurrence of coastal and inland flooding. Coastal flooding can cause pollution of coastal waters (Aguilera et al., 2019).

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include preparation, with strong attention to weather forecasts, assessing infrastructure flooding vulnerability, and developing plans to mitigate flood severity and frequency.

5.2.7. HUMAN-CAUSED HAZARDS (TERRORISM & HAZARDOUS MATERIALS INCIDENTS (CBRNE THREATS))

Nature of the Hazard

Human-caused hazards are distinct from natural hazards because they result directly from the actions of people. Two types of human-caused hazards can be identified as 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 chemical, biological, radiological, nuclear, and explosive (CBRNE) 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 Incidents (CBRNE Threats)

Technological hazards involving hazardous material releases can occur at facilities (fixed site) or along transportation routes (off-site). They can occur because 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 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 decommissioning of San Onofre Nuclear Generating Station (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 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 serious international and domestic terrorist incidents during the 1990's and early 2000's, people 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.

Disaster History

Hazardous Materials Incidents (CBRNE Threats)

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 thousands of 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.

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, 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.

A table within Attachment A 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.

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 emergency response history for San Diego County detailed in Attachment A chronicles various hazardous materials releases, the incidents do not necessarily indicate the degree of exposure to the public.

There has not been significant exposure to the San Diego County public due to human-caused 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. 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 most bomb threats are hoaxes, authorities have been required to mobilize resources and activate emergency procedures on a regular basis in response.

Other Human-Caused 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.

In 1984, a shooter 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.

In 2019, a shooter opened fire at the Chabad of Poway Synagogue, which killed one person and injured three other people. The same shooter was also linked to a 2019 fire set to the Dar-ul-Arqam Mosque (also known as the Islamic Center of Escondido) in Escondido.[117] The shooter pleaded guilty on July 20, 2021, to murder and multiple charges of attempted murder, with added hate crime classifications in connection with the Chabad of Poway Synagogue shooting and pleaded guilty to a charge of arson in connection with Dar-ul-Arqam Mosque in Escondido. [118]

Hazard Impacts

This hazard's impacts vary according to type, magnitude, location, availability of resources and many other factors that are situationally dependent. Overall, hazard impacts may include, but are not limited to injury, death, environmental/resource impacts, and structure/asset losses.

Location & Extent/Probability of Occurrence & Magnitude

Information related to the probability and magnitude of human-caused hazards is considered sensitive homeland security related information. As a result, this information is provided in a separate confidential document (*Planning Partners, see Attachment A*).

The probability of occurrence for an active threat can be difficult to quantify, largely due to different definitions of what constitutes an active threat. However, the fact that the planning area has experienced such incidents suggests the effective probability of any human-caused hazard is "Likely", meaning 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Climate Change Considerations

Not applicable.

[117] https://www.cbs8.com/article/news/crime/accused-chabad-of-poway-synagogue-shooter-pleads-guilty/509-4c8b3421-71e5-45e4-b1da-eac4dfe24f55.

[118] https://www.nbcsandiego.com/news/local/poway-synagogue-shooter-to-be-sentenced-in-state-court/2731560/.

5.2.8. LIQUEFACTION

Nature of the Hazard

This hazard is profiled independently in this section but is otherwise grouped with "Earthquake" hazard throughout this plan, particularly the prioritized hazard list and the Vulnerability Assessment sections of this plan. Therefore, there is no Hazard Assessment ranking for this hazard in Section 5.1's table.

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.

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 have not occurred because 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.

Hazard Impacts

A study published in the Journal of Geotechnical and Geoenvironmental Engineering, *Limitations of Surface Liquefaction Manifestation Severity Index Models Used in Conjunction with Simplified Stress-Based Triggering Models*, March 2022, Upadhyaya et al. outlines the factors that are used to determine liquefaction impact severity. Based on the model data the severity of surface manifestation of liquefaction is commonly used to represent liquefaction damage potential and the inclusion of an improved manifestation severity index (MSI) can better account for surficial liquefaction damage potential. This severity index assigns liquefaction zones a Liquefaction Severity Number (LSN) which is determined by various soil depths, the number of soil layers and their consistency, and surface weight contributions. San Diego County has not experienced liquefaction in the past. Given the location of the Rose Canyon and Elsinore zoned earthquake faults in the San Diego County with potential magnitudes of up to 6.9 and the various liquefaction zones outlined in Figure 6, there is the potential for extensive impacts. These impacts include building and road foundations that may sink into what was previously solid ground. Additionally, there is a threat to life and property, including buildings, their contents, electric generating facilities and transmission lines that could also be damaged and affect life support systems in communities outside the immediate hazard area.

Location & Extent/Probability of Occurrence & 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. The figure below displays the locations and extent of areas with a risk of liquefaction:

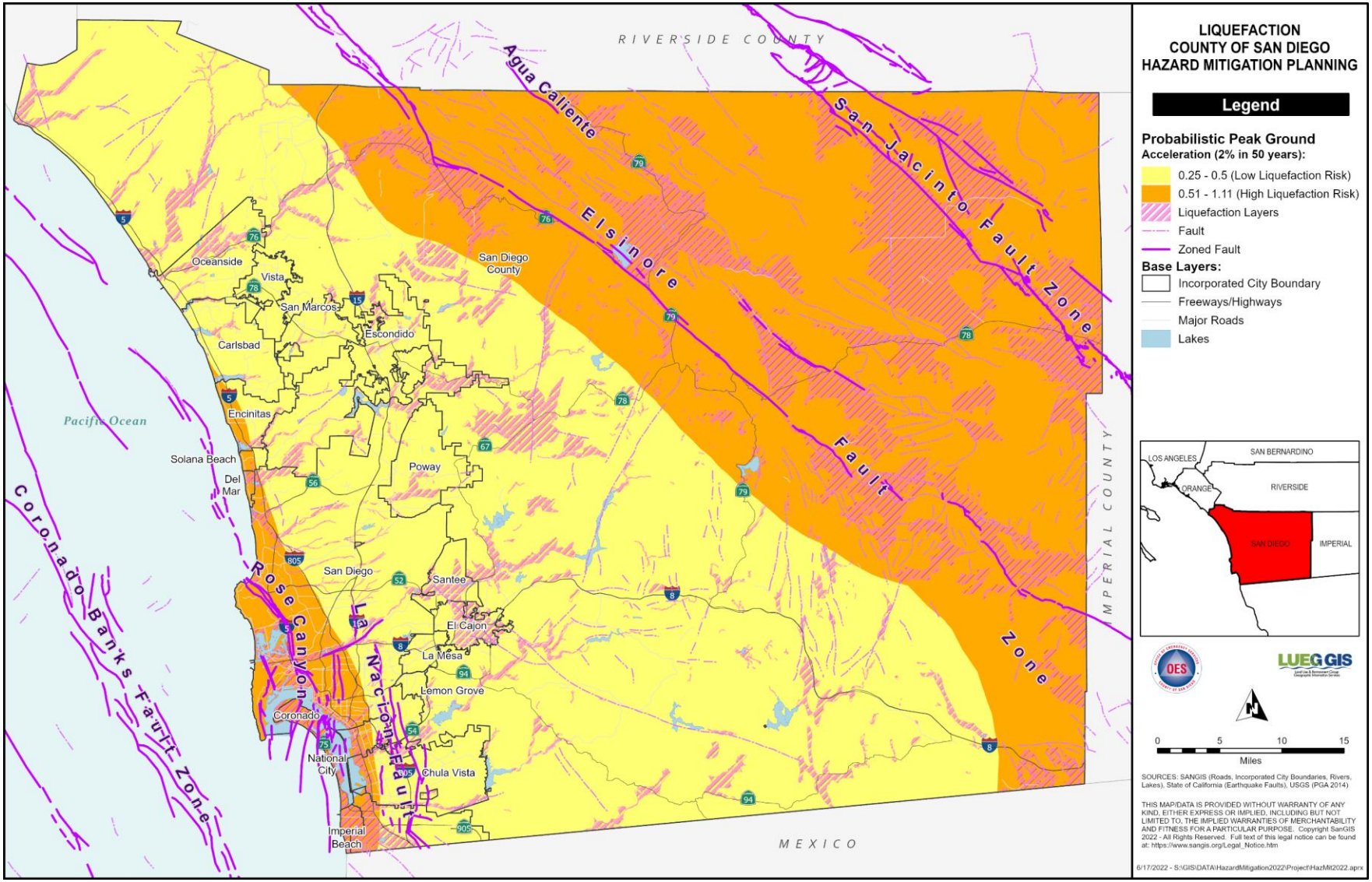


FIGURE 6: MAP OF SAN DIEGO COUNTY LIQUEFACTION RISK AREAS

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.

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.

TABLE 18: PGA LIQUIFACTION RISK

PGA	Soil Type				
	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

Areas where soil types D or E are located are illustrated in the figure below.

This hazard is profiled independently in this section but is otherwise grouped with "Earthquake" hazard throughout this plan, particularly the prioritized hazard list and the Vulnerability Assessment sections of this plan. Therefore, there is no Hazard Assessment ranking for this hazard in Section 5.1's table. However, using the same scientific scale as the other hazards, probability of liquefaction in San Diego County is considered somewhat "Likely", meaning 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Climate Change Considerations

Not applicable.

5.2.9. RAIN-INDUCED LANDSLIDE

Nature of the 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 oversteepened.

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.

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.

Past Significant Landslide Occurrences:

- Mt. Soledad in La Jolla (12/15/1961) [119]
- Oceanside (1/19/2005) [120]
- east side of Point Loma (4/15/2009) [121]
- western Camp Pendleton (2/28/2017). [122]

Some of the most recent, significant coastal bluff landslides have occurred:

- in Torrey Pines (8/31/2019)
- in Del Mar (11/19/2019)
- along north La Jolla, Black's Beach (5/2/2020)

[119] https://www.sandiegouniontribune.com/news/150-years/sd-me-150-years-december-15-htmlstory.html

[120] https://www.sandiegouniontribune.com/sdut-landslide-undercuts-eight-homes-in-oceanside-2005jan19-story.html

[121] https://www.sandiegouniontribune.com/sdut-bn15slide13057-2009apr15-story.html

[122] https://patch.com/california/oceanside-camppendleton/road-closed-due-landslide-camp-pendleton

- in Encinitas (8/2/2019, 4/10/2020).[123]

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 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.

Hazard Impacts

Impacts from landslides in the San Diego County can vary greatly. In unpopulated areas, landslides have little effect except to the extent they fill in waterways and create flooding issues, water conveyance, and introduce contaminants. However, if landslides occur in populated areas, damages can be sustained to buildings, critical facilities, infrastructure, and injuries, and in extreme cases deaths, can occur. Landslides can affect ingress and egress routes. Many locations in the County have limited ingress and egress routes. Cutting off one of these routes can cause multiple issues such as limiting emergency response to hazards.

Location & Extent/Probability of Occurrence & 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 the figure below, the location and extent of landslide hazard areas are generally concentrated along canyons near the coastal areas with steep slopes:

[123] https://cadoc.maps.arcgis.com/apps/webappviewer/index.html?id=bc48ad40e3504134a1fc8f3909659041

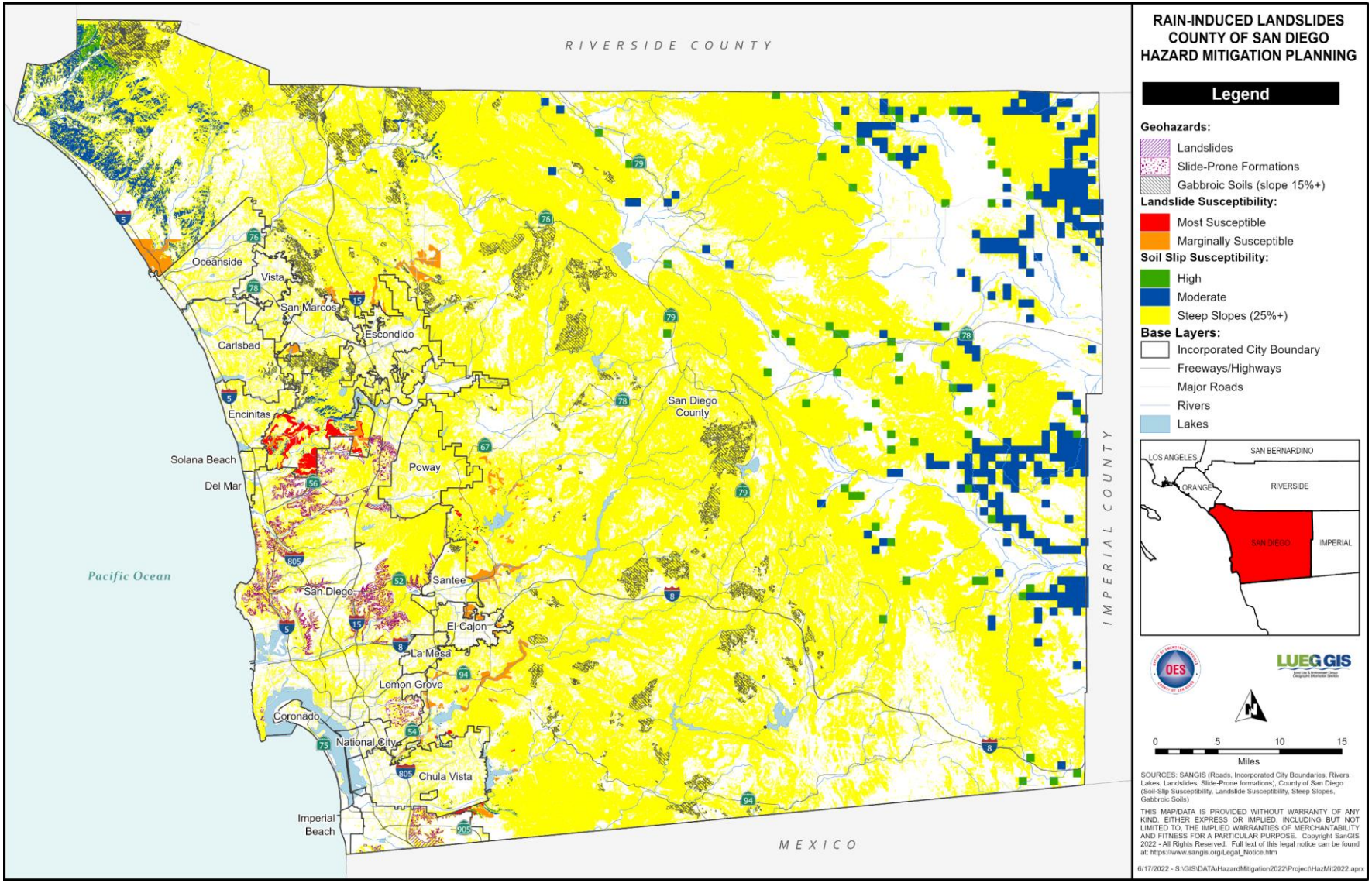


FIGURE 7: MAP OF SAN DIEGO COUNTY RAIN-INDUCED LANDSLIDE SUSCEPTIBILITIES

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 probability of a rain-induced landslide is considered "Unlikely". However, HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public determined the Overall Significance rating of this hazard to be "Medium", meaning the criteria falls mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating. This rating is sometimes used for hazards with a high extent rating but very low probability rating.

In San Diego County, rain-induced landslides typically occur during and after severe storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. The FEMA National Risk Index estimates that the annualized frequency of landslide events in San Diego County is 0.1 distinct events per year. In general San Diego County can expect to experience significant rain-induced landslide events during strong El Niño years or large atmospheric rivers. In areas recently burned by wildfires, landslides may occur more frequently and are possible during annual rain events.

Climate Change Considerations

Post-fire debris flows require high intensity precipitation. Global Climate models do not project hourly rates of precipitation. One study that dynamically downscaled climate projection suggested that hourly precipitation rates in the mountainous area increased in Central and Northern California (Huang et al, 2020), but it did show results over San Diego.

The highest priority mitigation actions to reduce Climate Change impacts on this hazard should include evaluation of vulnerable landscapes, monitoring and educating partners and the public, paying attention to weather forecasts of heavy and prolonged rainfall, especially in conditions when landscape is already soaked, consulting with experts in landslides/debris flows.

5.2.10. SEA LEVEL RISE/COASTAL STORMS/EROSION

Nature of the Hazard

These three hazards were mapped and profiled as a group because many of the factors and risks involved are similar and limited to the coastal areas.

Rising and falling water levels, breaking waves, and shifting sands are common to life along the coast. These normal coastal features become hazardous when they strengthen in intensity — usually during a storm event — and pose an immediate threat to the lives and livelihoods of coastal populations.[124] These 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.

[124] https://www.fema.gov/sites/default/files/documents/fema_coastal-glossary.pdf

Sea Level Rise is an increase in sea level caused by a change in the volume of the world's oceans and changes in local ground elevations. Sea level rise leads to increased frequency and depth of flooding in coastal areas.[125]

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 further inland and occur more often[126]. Beaches and cliffs could also see increased erosion as they are exposed to more hours of high sea levels and wave action.[127] The NOAA Sea Level Rise Viewer allows for planers to predict the impact of sea level rise over the next several decades. It can be found at https://coast.noaa.gov/slr/.

According to the Sea Level Rise Adaptation Strategy for the San Diego Bay, the sectors that are 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.[128] In addition, some of San Diego's military installations and the region controlled by the Port of San Diego may also be affected.[129] However, 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 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 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/probability of coastal erosion in San Diego County is considered "Likely".

Disaster History

Since 2000, sea level has been increasing as the wind systems relaxed once again (Bromirski et al., 2011, 2012; Hamlington et al., 2016). For the San Diego region, sea-level rise models project similar ranges in elevated sea-levels until 2050 (approximately 0.6 to 1.3 feet). In the second half of the century, sea-level rise is expected to accelerate significantly, but there is greater uncertainty as to how extreme this rise will be at the end of the century (0.9 to 4 feet) with the possibility that it is much higher (Griggs et al., 2017). This is related to unknown global greenhouse gas emission reductions and uncertainties about how rapid ocean warming will impact ice sheet melting (Griggs et al., 2017; Kalansky et al., 2018).

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 3,900 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 currently 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.

[125] https://www.fema.gov/sites/default/files/documents/fema_coastal-glossary.pdf

[126] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation

[127] Ibid.

[128] Ibid.

[129] Ibid.

Two rounds of large long period northwest swell arrived at the beaches between the 16th and 20th of January 2018. This brought high surf to west and northwest facing beaches with peak sets occurring in southern San Diego County. Significant beach erosion was reported along with isolated coastal flooding. A year later in January of 2019, high tides and surf brought large waves and coastal flooding to Southern California. Areas of the San Diego County coastline observed sets as high as 15 feet and significant coastal flooding due to the King Tides. There were many water rescues due to the high surf and rip currents, and extensive damage to the Ocean Beach Pier in San Diego County.

Southern California watched as Baja California prepared for the Category 2 force winds and storm surge of Hurricane Kay in September 2022. The storm weakened and made landfall in San Diego as a Tropical Storm producing 5.6 inches of rain in the San Diego Mountains and wind gusts registering up to 109 mph. Although no major damage was seen locally other than fallen trees, the tropical storm caused severe debris flows in San Bernardino County causing a Proclaimed Local Emergency and the loss of life. The storm also caused over $13 million in railroad damages along the coast in Orange County.

Hazard Impacts

Tens of millions of people in the U.S. and hundreds of millions globally live in areas that are at risk of coastal flooding. Sea level rise does not act alone — rising sea levels, along with sinking lands, will combine with other coastal flood factors like storm surge, wave effects, river flows, and heavy rains to significantly increase the exposure to coastal communities, ecosystems, and economies. Sea level rise potentially threatens infrastructure necessary for local jobs, regional industries, and public safety, such as roads, subways, drinking water supplies, power plants, oil and gas wells, and sewage treatment systems.

Long-term sea level rise will affect the extent, frequency, and duration of coastal flooding events. High-tide flooding events that occur only a few times a year now may occur once a month, or once a week in the coming decades. These same water level changes may also increase coastal erosion and groundwater levels. Elevated groundwater levels can lead to increased rainfall runoff and compromised underground infrastructure, such as public utilities, septic systems, and structural foundations. Higher water levels also mean deadly and destructive storm surges, wave impacts, and rainwater are unable to drain away from homes and businesses.

Location & Extent/Probability of Occurrence & Magnitude

The figures in the next, “Tsunami” section display the locations and extent of tsunami, coastal storm, erosion, and sea level rise hazard areas for the County of San Diego. These hazards were mapped together due to Vulnerability Assessment results and subject matter expert feedback. As shown in those figures, 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.

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 the figure below.

The risk of damage from sea level rise is considered somewhat “Likely” with the risk of damage from coastal erosion considered to be “Likely” and 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. 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 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.

According to NOAA's 2022 Sea Level Rise Technical Report, sea-level is predicted to rise 4-8 inches by 2030 on the West coast, which includes the San Diego County. While sea-level rise has a high certainty rating and is already occurring, its onset is not expected to occur until closer to the end of the century in terms of changes in areas already vulnerable to flooding or causing permanent inundation in tidally influenced areas of San Diego County. The probability of these hazards occurring is "Likely", meaning 10 to 90 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years.

Climate Change Considerations

The coast is an important part of San Diego's landscape, culture, and economy. It is also one of the more vulnerable landscapes in San Diego as many of its beaches, cliffs, and estuaries are already experiencing erosion and flooding, and these hazards are expected to accelerate in frequency and intensity with climate change.

Over the last century sea level has risen about 0.6 ft over much of the Central and Southern California coast. Global sea level provides an important indicator of the state of the warming climate, but regional sea-level rise varies across coastal communities because processes that cause sea-level rise interact differently and vary across coastal regions (Hamlington et al., 2020). Between 1980 and 2000, sea level along San Diego was relatively stable, even decreasing slightly as stronger wind stress gradients over the eastern Pacific suppressed the global rise along North America.

Since 2000, sea level has been increasing as the wind systems relaxed once again (Bromirski et al., 2011, 2012; Hamlington et al., 2016). For the San Diego region, sea-level rise models project similar ranges in elevated sea-levels until 2050 (approximately 0.6 to 1.3 feet). In the second half of the century, sea-level rise is expected to accelerate significantly, but there is greater uncertainty as to how extreme this rise will be at the end of the century (0.9 to 4 feet) with the possibility that it is much higher (Griggs et al., 2017). This is related to unknown global greenhouse gas emission reductions and uncertainties about how rapid ocean warming will impact ice sheet melting (Griggs et al., 2017; Kalansky et al., 2018).

Given the increased rate of sea level rise, in the near term the greatest impacts from sea level rise are mostly likely to occur during events that combine high tides, El Nino and both locally and distantly generated wind-driven waves. For example, the generally elevated sea levels along the California coast during the super El Nino of 1982-83 were heightened by large winter storms and high waves during high tide periods, causing enormous coastal damage along the San Diego County shoreline (Flick, 1998).

Cliff erosion is a natural coastal process for much of northern San Diego County. In San Diego, between 1998 and 2009 the mean cliff top retreat was 0.46 ft/yr (Young, 2018). San Onofre State Beach is a cliff erosion hot spot in San Diego County due to extensive deep-seated landslide (Adam P Young, 2015). Other areas in north San Diego County, such as Encinitas and Del Mar, have also experienced a number of significant cliff failures in recent years. Researchers are advancing understanding of how wave-cliff impacts and rainfall contribute to both upper and lower coastal cliff erosion providing insight into how increasing sea levels, and storm driven waves and rainfall may further accelerate this erosion (Young et al., 2021)

5.2.11. TSUNAMI

Nature of the Hazard

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.

Disaster History

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, February 2010 with a wave height of 0.6 meters; June, 2011 with wave height of 2 feet; and January 15, 2022 with a wave height of 1-3 feet. [130]

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.

The California Tsunami Program, led by the California Governor's Office of Emergency Services (Cal OES) and the California Geological Survey (CGS), is responsible for updating the State's Tsunami Hazard Area Maps for emergency response planning and public safety. Communities use the State tsunami maps to develop and update their evacuation maps and plans. The State is constantly evaluating tsunami events, sources, and analysis techniques to ensure that coastal communities are safe from tsunami hazards.

The State has updated previous 2009 Tsunami Inundation Maps by working with local emergency management officials and Cal OES. Each County provides important considerations to CGS' decision on the inland boundaries of the Tsunami Hazard Area.

The State tsunami website (www.tsunami.ca.gov), includes new Tsunami Hazard Area maps/data available to view and download using easy-to-use, interactive web applications. Find a location by typing in an address or use a current location to pinpoint the location on the Tsunami Hazard Map. This is useful to find out if you are in a Tsunami Hazard Area wherever you live, work, or visit. As local tsunami evacuation brochures are developed, they will also be added to the online map interface. [131]

Hazard Impacts

Tsunamis are a threat to life and property along the coast. From 1950 to 2007, 478 tsunamis were recorded globally. Fifty-one of these events caused fatalities, to a total of over 308,000 coastal residents. The

[130] https://www.ngdc.noaa.gov/hazel/view/hazards/tsunami/runup-more-info/36305.

[131] California Tsunami Program, *"Tsunami Hazard Area Maps Talking Points."* 2022.

overwhelming majority of these events occurred in the Pacific basin. Recent tsunamis have struck Nicaragua, Indonesia, and Japan, killing several thousand people. Property damage due to these waves was nearly $1 billion. Historically, tsunamis originating in the northern Pacific and along the west coast of South America have caused more damage on the west coast of the United States than tsunamis originating in Japan and the Southwest Pacific.

It is consensus that San Diego County could see moderate impacts from a tsunami originating in the Pacific Ocean, specifically a far source originating in the Aleutian Islands. However, a near source tsunami event originating from an offshore displacement of geological material, earthquake or underwater landslide can occur any time. The resulting floodwater waves can carry damaging debris and inundate homes, businesses, and government buildings in the coastal cities such as the cities of San Diego, National City, Carlsbad, and the various beach communities.

Location & Extent/Probability of Occurrence & Magnitude

The figures below display the locations and extent of tsunami, coastal storm, erosion and sea level rise hazard areas for the County of San Diego. As shown in these figures, 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:

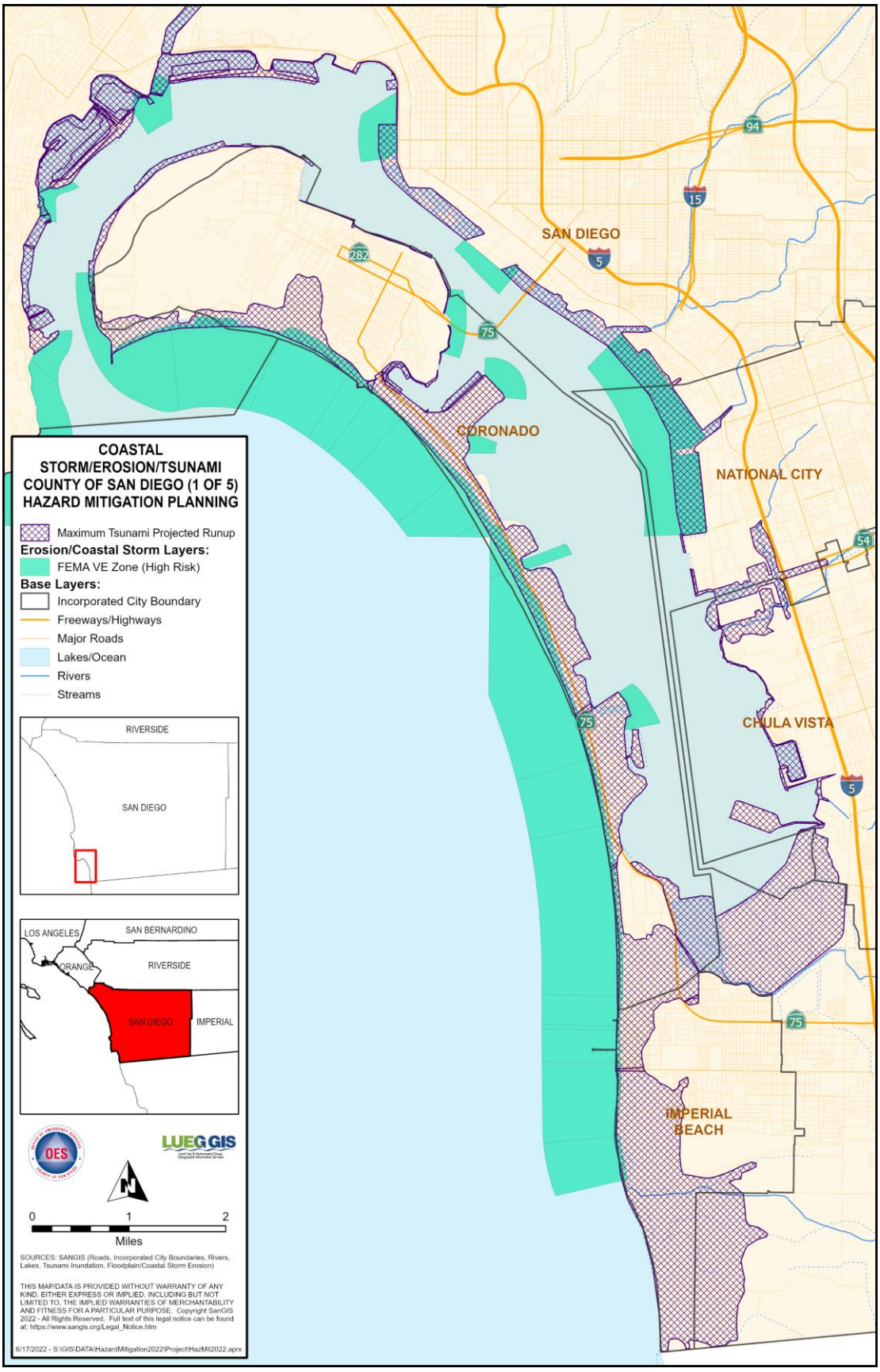


FIGURE 8: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (1 OF 5)

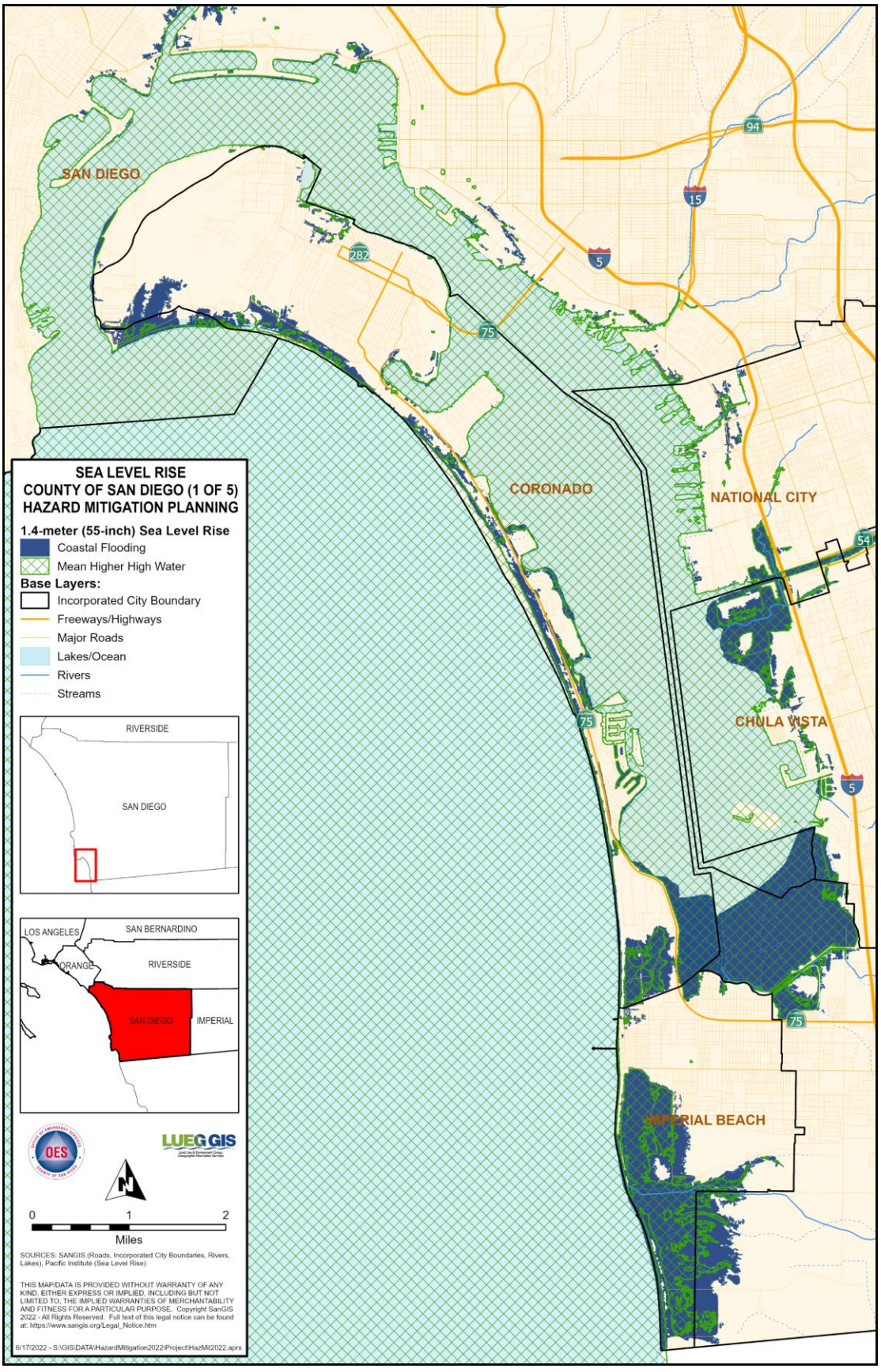


Figure 9: Map of San Diego County Sea Level Rise Hazard Areas (1 Of 5)

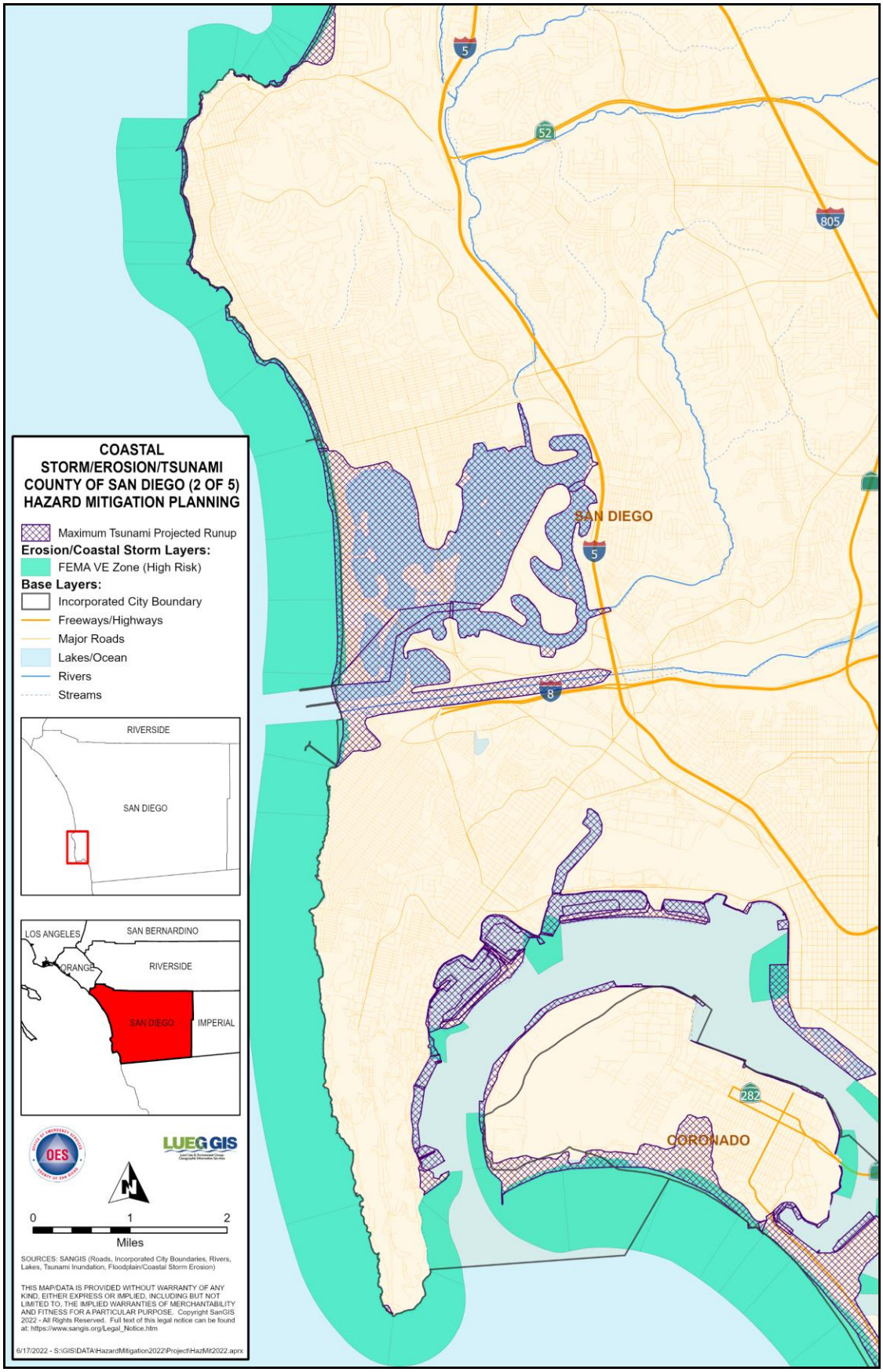


FIGURE 10: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (2 OF 5)

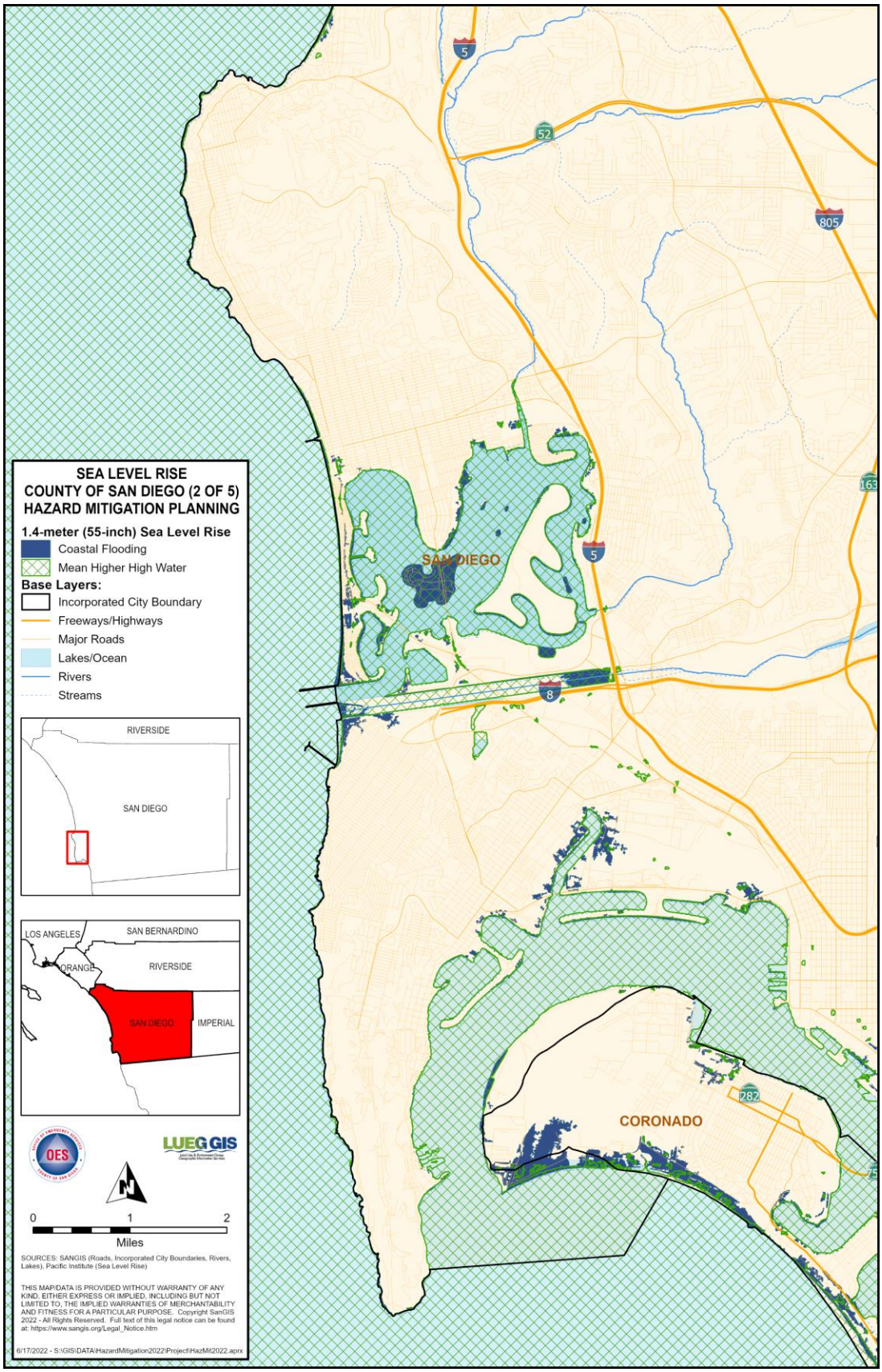


Figure 11: Map of San Diego County Sea Level Rise Hazard Areas (2 of 5)

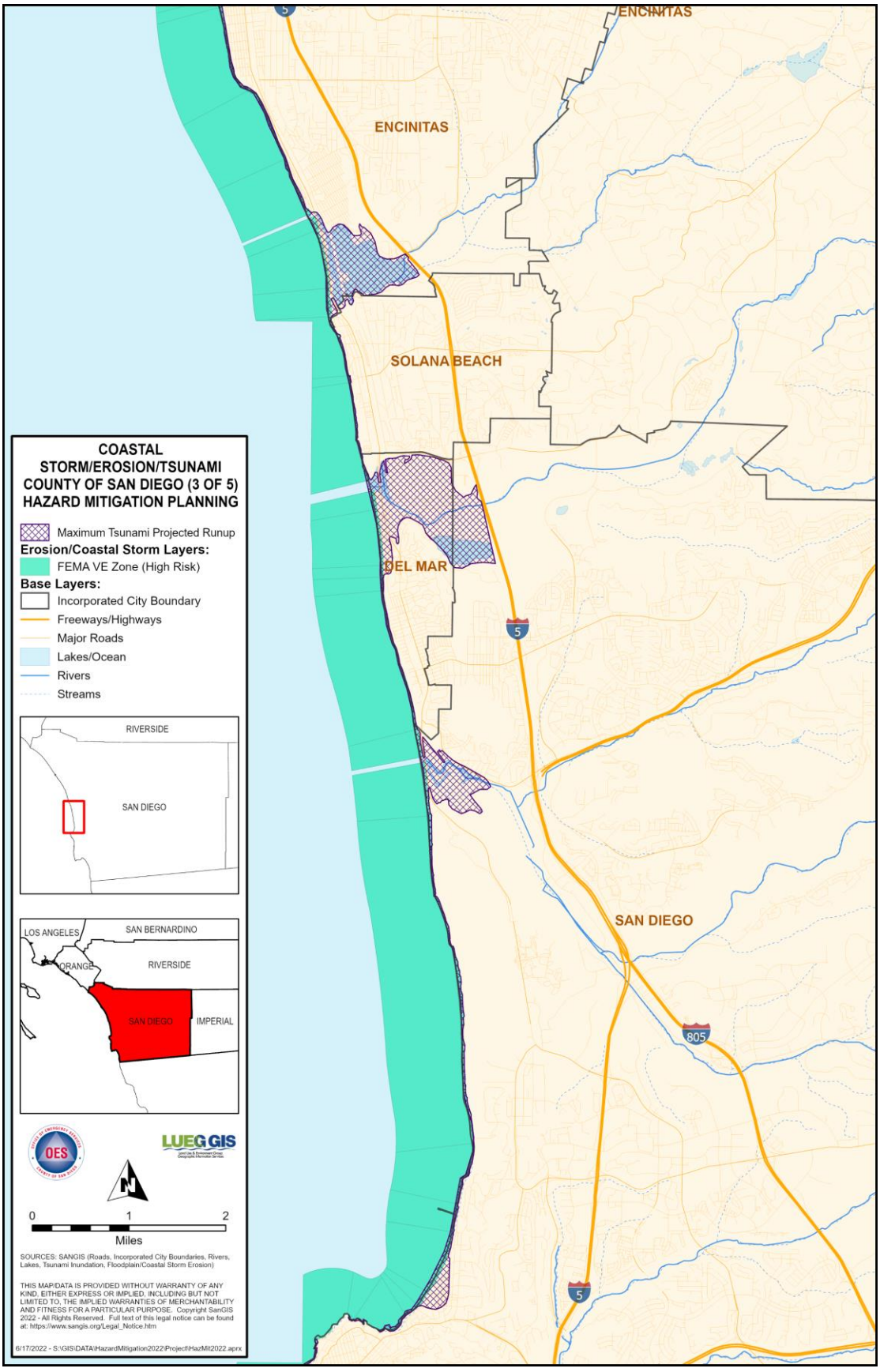


FIGURE 12: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (3 OF 5)

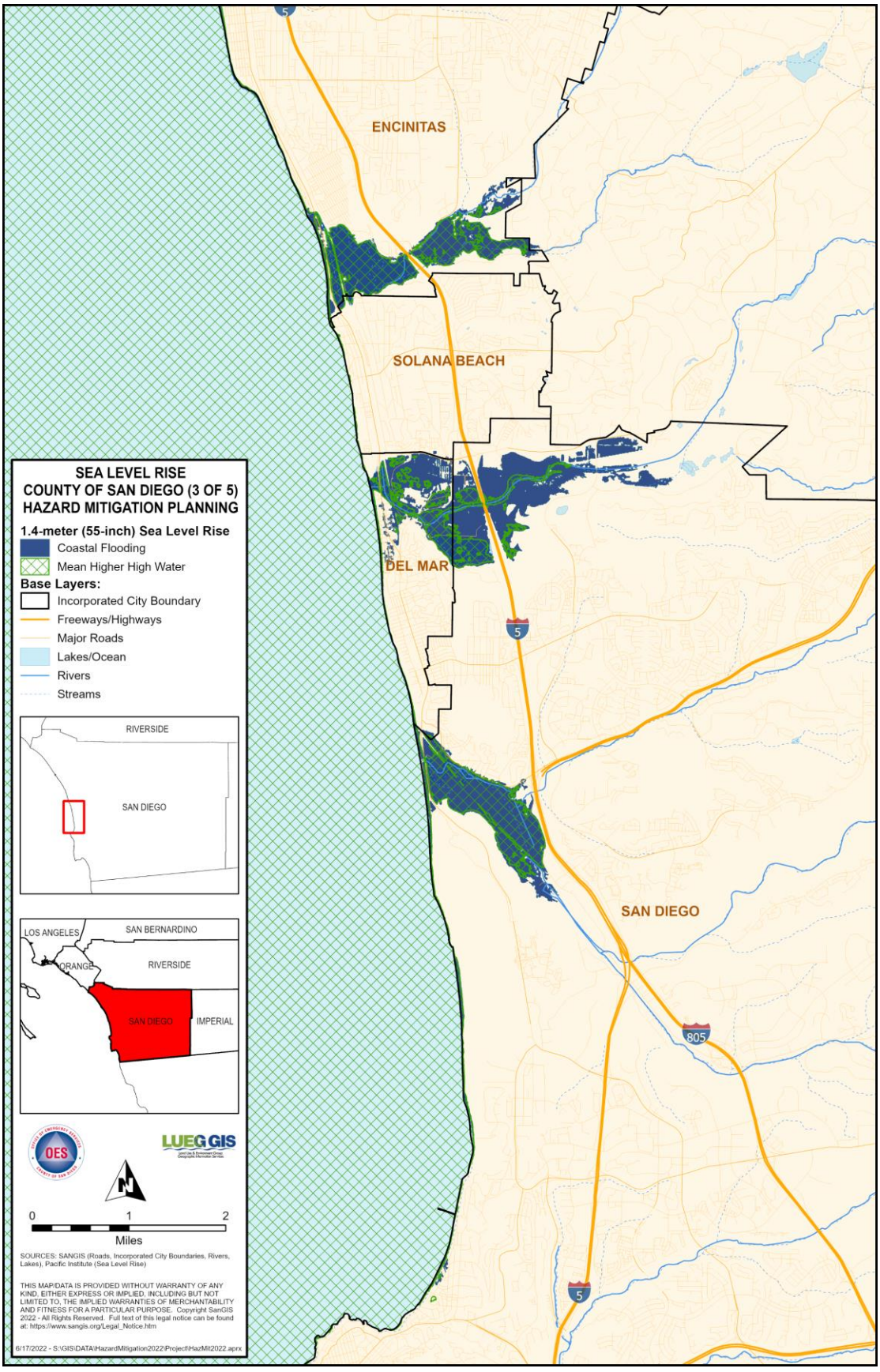


Figure 13: Map of San Diego County Sea Level Rise Hazard Areas (3 of 5)

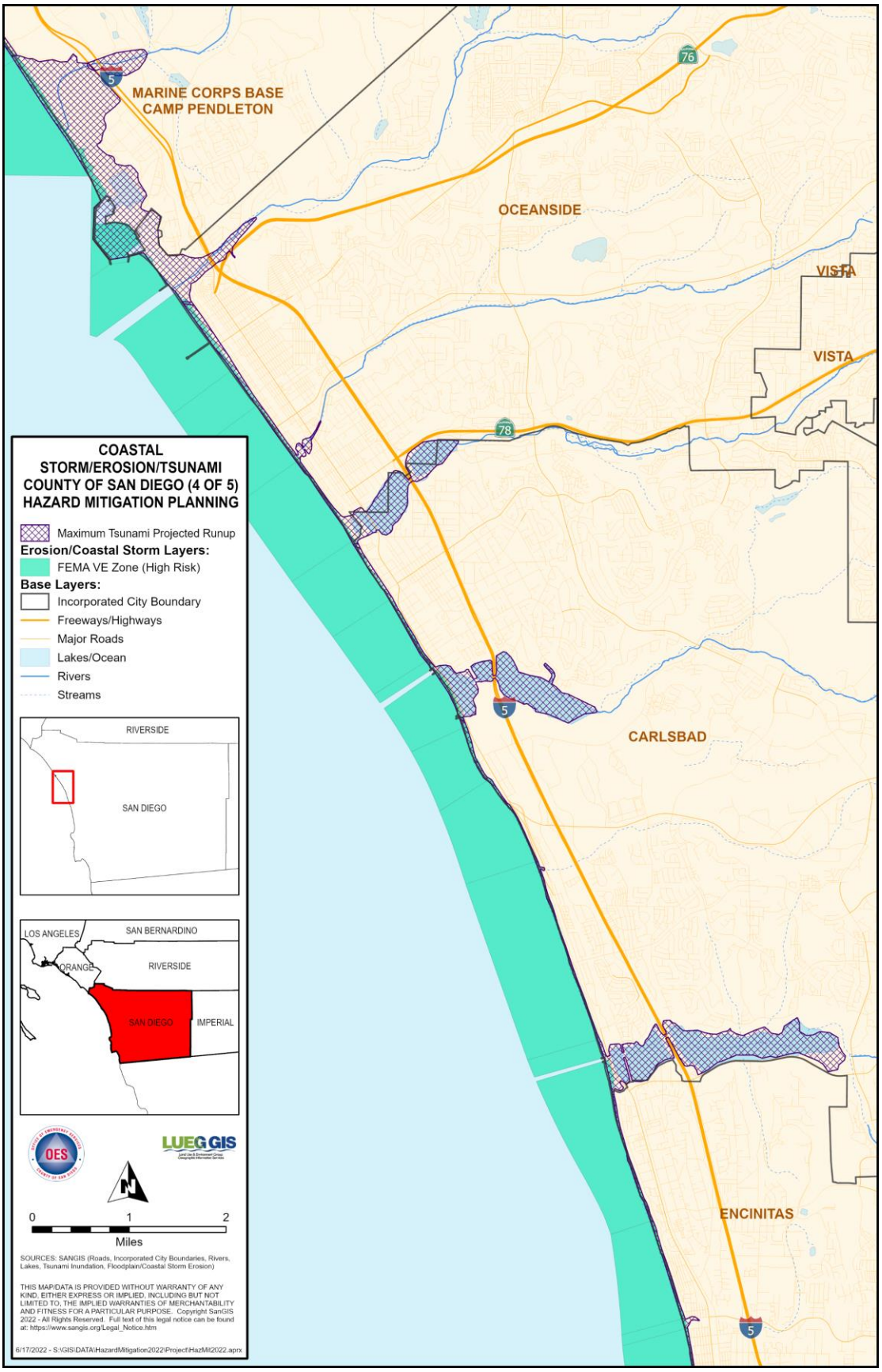


FIGURE 14: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (4 OF 5)

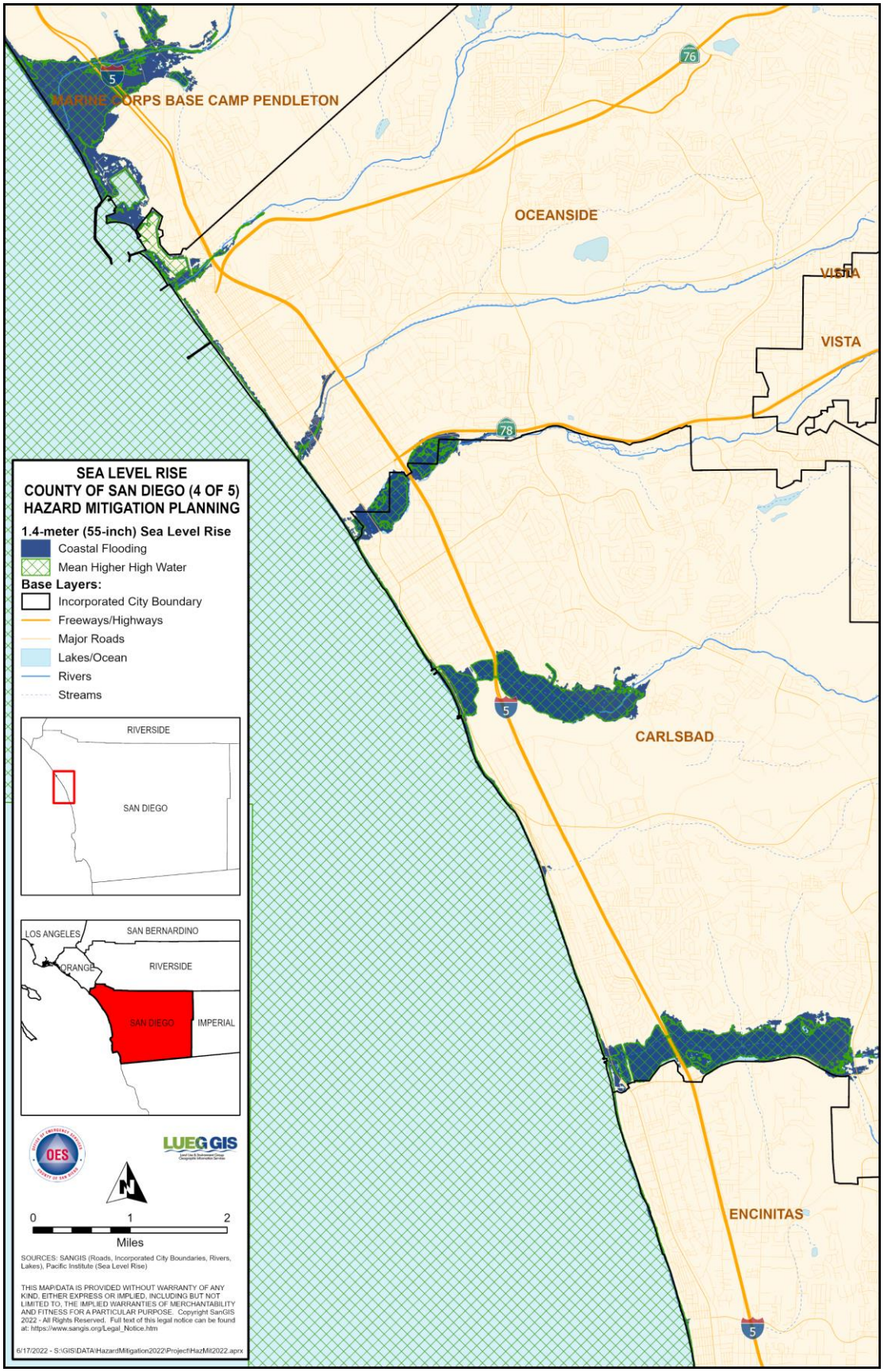


FIGURE 15: MAP OF SAN DIEGO COUNTY SEA LEVEL RISE HAZARD AREAS (4 OF 5)

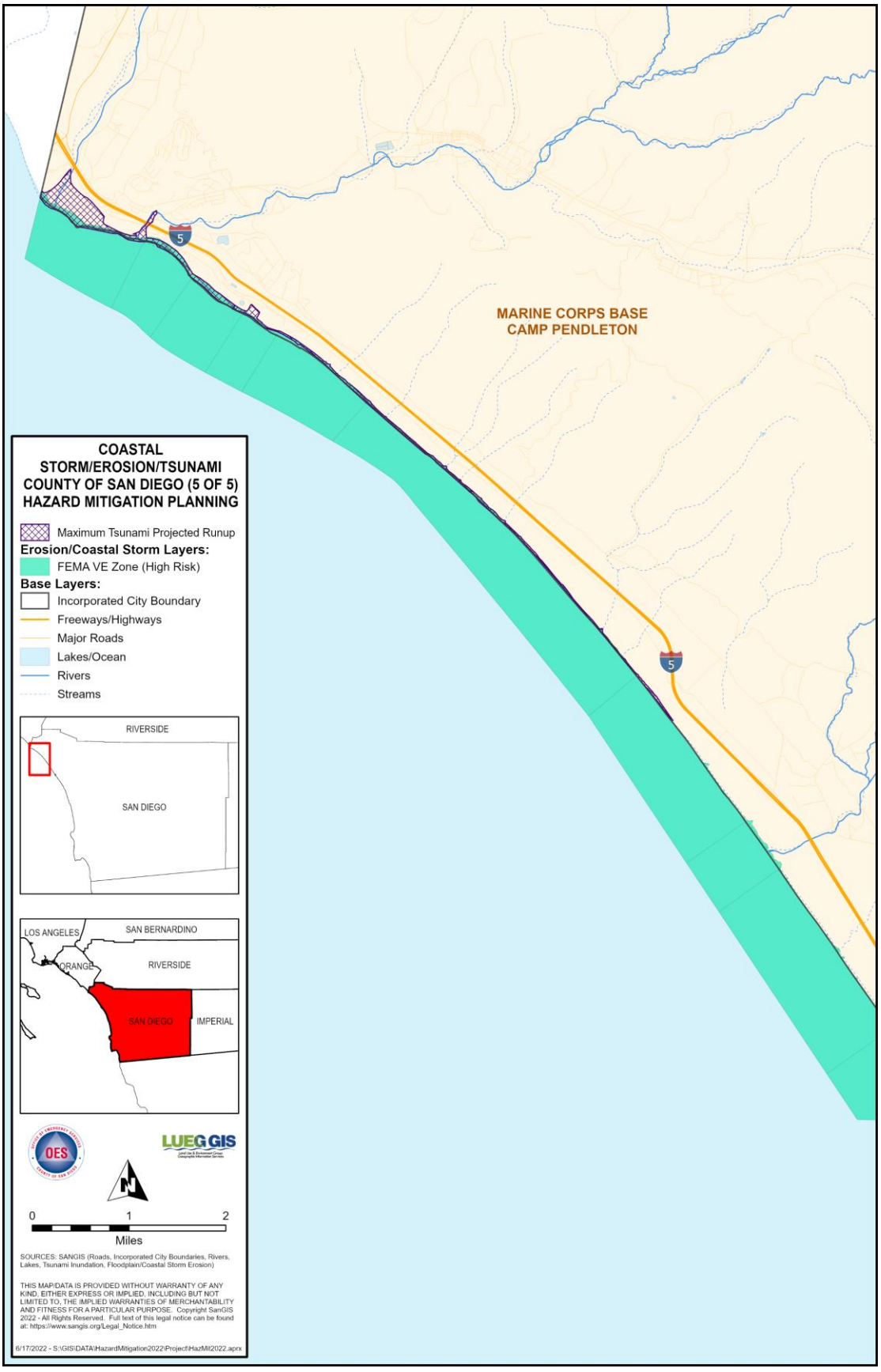


FIGURE 3: MAP OF SAN DIEGO COUNTY COASTAL STORM/EROSION/TSUNAMI HAZARD AREAS (5 OF 5)

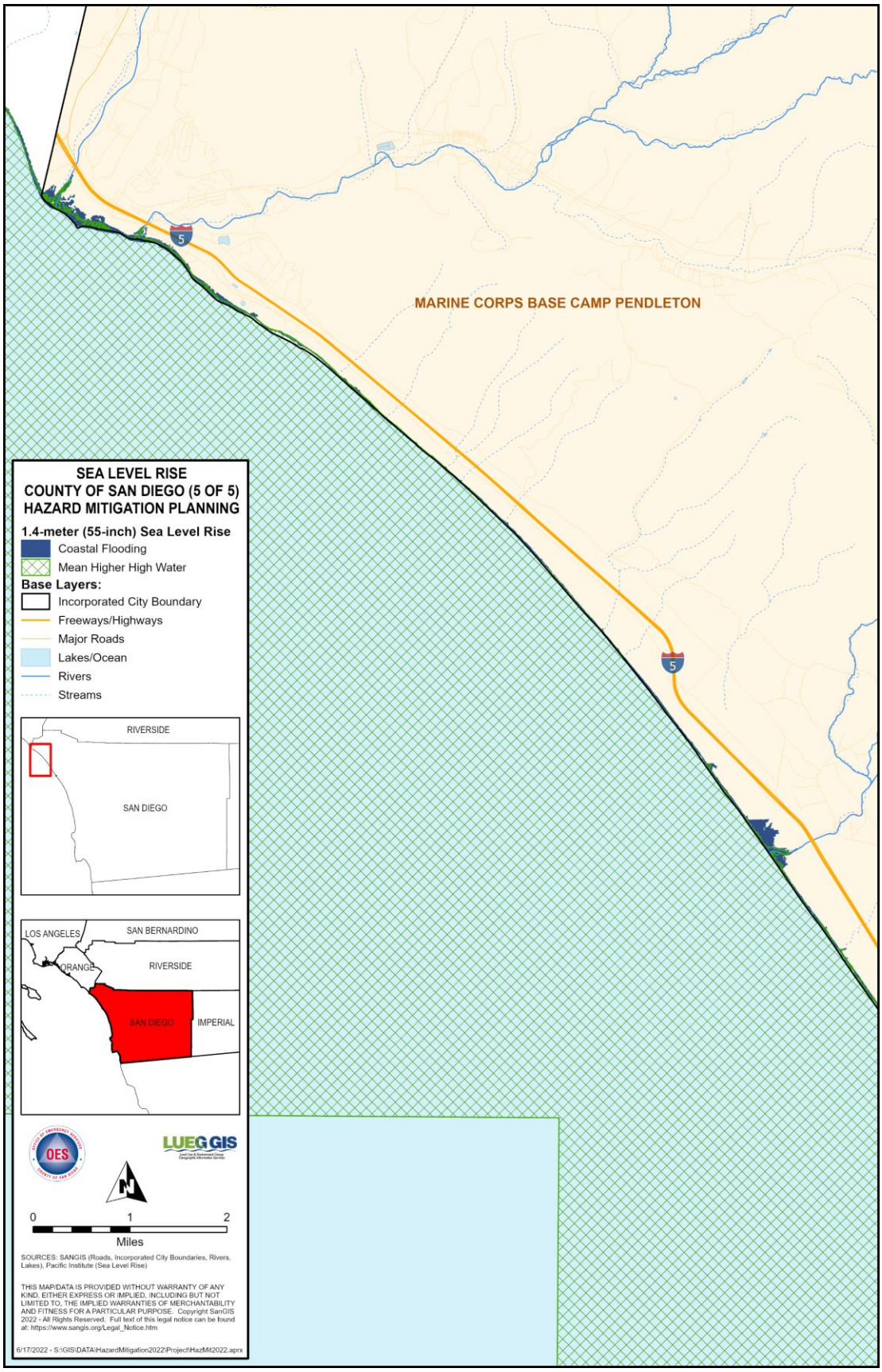


FIGURE 17: MAP OF SAN DIEGO COUNTY SEA LEVEL RISE HAZARD AREAS (5 OF 5)

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. 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 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.

According to University of Southern California engineers, the "likelihood of a large tsunami to strike California would be hard to predict… small tsunamis will swell into California [which includes San Diego County] every few years." [132] [133] **In addition, Cal OES and CGS are preparing a new type of tsunami hazard map, the probabilistic tsunami hazard analysis map, which will show potential tsunami events that have a 1000-year average return occurrence. The probability of this hazard occurrence is "Unlikely", meaning less than 1 percent probability of occurrence in the next year or a recurrence interval of greater than every 100 years. However, HAZUS Data Evaluations, Vulnerability Assessments, Hazard Seminar Series, and input from Subject Matter Experts and the public determined this hazard's Overall Significance rating is "Medium", meaning the criteria falls mostly in the middle ranges of classifications and the event's impacts on the planning area are noticeable but not devastating.**

5.2.12. WILDFIRE/STRUCTURE FIRE

Nature of Hazard

A structure 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 high-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 wildfire is in a wildland 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.

[132] https://news.usc.edu/6031/A-Tsunami-50-Feet-High-Could-Hit-Southern-California/

[133] https://news.usc.edu/6031/A-Tsunami-50-Feet-High-Could-Hit-Southern-California/

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.

Disaster History

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.

In October 2003, the second-worse 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 approximately $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.

Wildland fires prompted seven (7) Proclaimed States of Emergency, and Urban/Intermix Fires prompted four (4) Proclaimed States of Emergency in the County of San Diego between 1950-2020. The table below lists the most recent major wildfires in San Diego County.

TABLE 19: MAJOR WILDFIRES IN SAN DIEGO COUNTY LARGER THAN 5,000 ACRES OR RESULTING IN SIGNIFICANT STRUCTURE LOSS

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
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
May 2014 San Diego County Wildfires	May 2014	26,000	65	19	0
Border Fire	June 2016	7,609	18	4	2
Lilac Fire	December 2017	4,100	157	64	0
West Fire	July 2018	504	48	Not Available	0
Valley Fire	September 2020	16,390	66	Not Available	0
Southern Fire	May 2021	5,366	5	Not Available	0
Border 32 Fire	September 2022	4,456	14	Not Available	0

** Information gathered from the California Department of Forestry and Fire Protection website*

As of 12/31/2022 there have been no additional significant wildfire events in the planning area.

Hazard Impacts

Hazard impacts can include but are not limited to increased flooding risk over burn scar areas, environmental impacts/damage, air quality impacts, loss of resources such as utilities, asset/structure damage and/or total loss, injury, and death.

Location & Extent/Probability of Occurrence & Magnitude

The wildfire maps use the CAL Fire Resource Assessment Program data for Fire Hazard Severity Zones.

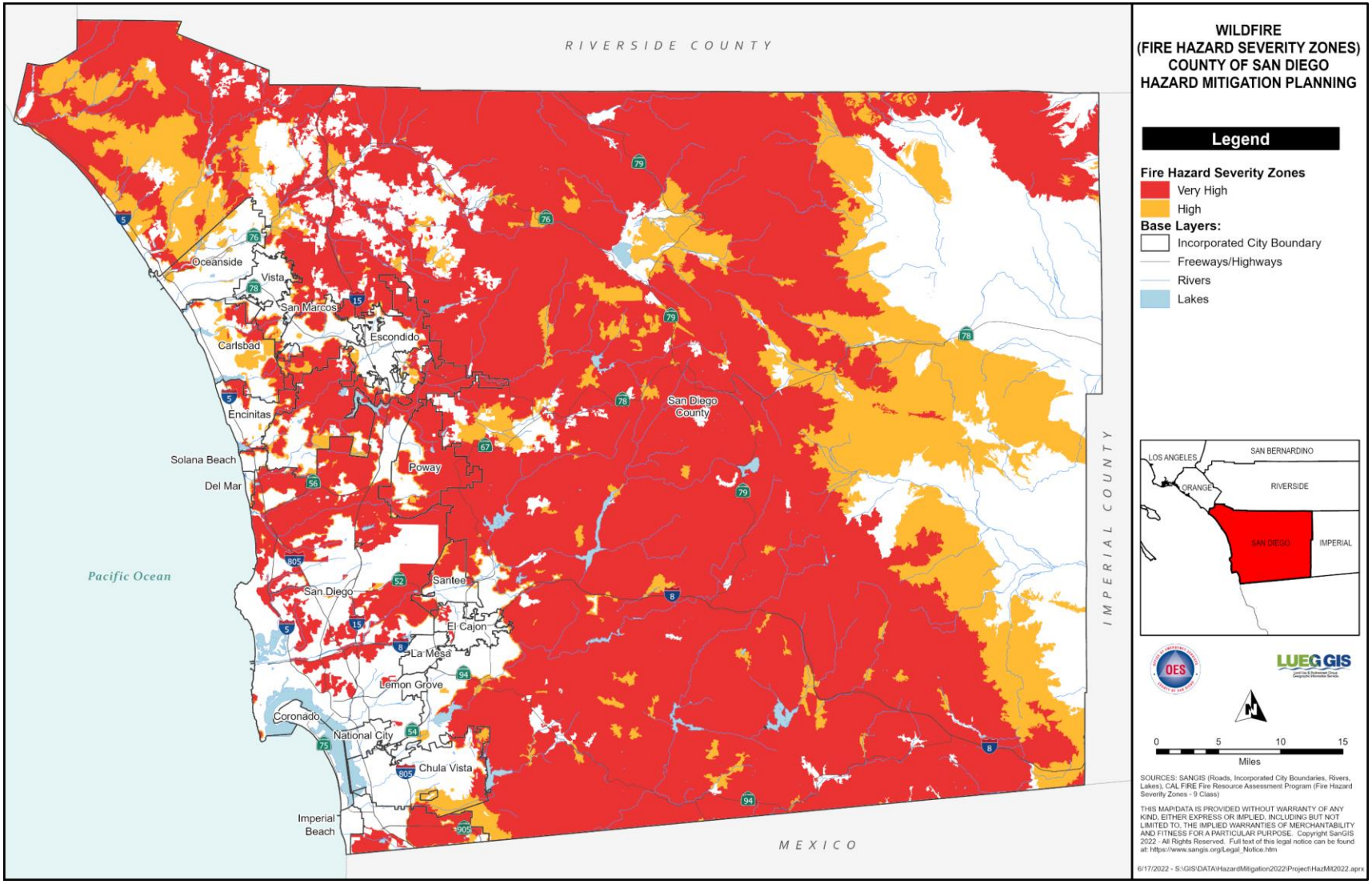


FIGURE 18: CAL FIRE FIRE HAZARD SEVERITY ZONES (HIGH AND VERY HIGH)

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.[134] The fire season could also become longer and less predictable, making firefighting efforts more costly.[135]

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*[136] 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 most likely 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.[137] 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.[138]

From May to October of each year, San Diego County faces a severe wildfire threat. Fires will continue to occur on an almost annual basis in the San Diego County Area. The threat of wildfire and potential losses consistently increase as human development and population increase in the wildland urban interface area in the County. According to the Cal Fire Redbook, there have been 1,113 wildfires recorded for San Diego County between 2015 and 2021. Based on climate and weather in San Diego County and the fuels, topography, past fire history, and the Cal Fire Redbook which indicates an average of 159 wildfires per year, the probability of future wildfire events are considered "Highly Likely".

5.2.13. SEVERE WINTER WEATHER

Nature of Hazard

According to the National Weather Service (NWS), a winter storm is a life-threatening combination of heavy snow, blowing snow and/or dangerous wind chills. However, most severe winter storms in the County of San Diego consist of heavy rain events, sometimes accompanied by thunderstorms, high winds, dense fog, hail, and freeze events. Heavy rain refers to events where the amount of rain exceeds normal levels. The amount of precipitation needed to qualify as heavy rain varies with location and season.

The County of San Diego's weather is influenced by the Pacific Ocean and routine climate patterns such as El Niño. El Niño is the warm phase of the El Niño-Southern Oscillation cycle, a pattern found in the tropical Pacific when there are fluctuations in temperatures between the ocean and atmosphere. During El Niño, the surface winds across the entire tropical Pacific are weaker than normal and the ocean surface is at above-average temperatures in the central and eastern tropical Pacific Ocean. El Niño typically develops over North America during the winter season causing the severe winter storms experienced by the County. This

[134] San Diego's Changing Climate: A Regional Wake-Up Call. A Summary of the Focus 2050 Study Presented by The San Diego Foundation.

[135] Ibid.

[136] 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.

[137] Ibid.

[138] Ibid.

climate pattern occurs every few years and brings with it above-average rain and snow across the southern region of United States, especially in California.

A relatively common weather pattern that brings southwest winds and heavy rain to California is often referred to as an atmospheric river. Atmospheric rivers are long, narrow regions in the atmosphere that transport most of the water vapor carried away from the tropics. These columns of vapor move with the weather, carrying large amounts of water vapor and strong winds. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow, causing flooding and mudslides

Extreme cold often accompanies a winter storm or is left in its wake. A freeze refers to a particularly cold spell of weather where the temperature drops below 32 degrees, most typically in the early morning hours. Rainfall during these periods may result in snowfall in the higher elevations of the County. Prolonged exposure to cold can be life-threatening, particularly to infants and the elderly. Freezing temperatures can cause significant damage to the agricultural industry.

Disaster History

A review of the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI), Storm Events Database show one extreme cold/wind chill event, two winter storm events, and three winter weather events were reported for San Diego County from October 1, 2017 through December 31, 2022. The following narrative from the NCEI and other sources summarizes each event:

January 20, 2018 - A weak trough and associate cold front brought light showers and breezy winds. A light coating of snow caused issues in the mountains. A quick burst of snow produced snow covered roads in Cuyamaca, at Mt. Laguna and along Sunrise Hwy and State Route 79.

February 5, 2019 - A cold front moved through Southern California and brought widespread rain, a few inches of snow, and frost to the region. Total rainfall amounts ranged from 1 to 2 inches, locally 4 inches in the San Diego County Mountains. Hourly rainfall thresholds for the Holy burn scar were exceeded in a couple of canyons, with the highest threshold of 0.71 per hour in Horsethief Canyon. Widespread frost occurred on February 7th, and reached the coastal areas of San Diego and Orange Counties. Icy roads on I-8 resulted in traffic accidents and two fatalities.

February 22, 2019 - A cold upper-level low moved into Southern California on February 21st and brought heavy snow, rain and hail. Julian received 8-12 inches of snow. Snow levels went down went down to 2,000 ft in the San Diego County Mountains. Reports of small hail in the coastal and valley areas. Intestate 8 was closed for 12 hours due to snow covered and icy roads.

March 10, 2019 - A weak atmospheric river moved over Southern California between March 6-11, bringing light to moderate rain, significant lightning and snow between 5,000 and 7,000 ft. Significant lightning from warm frontal lift and instability occurred throughout most of the region, with 500 cloud flashes and 330 cloud-to-ground strikes. Palomar Mountain received 3 inches of snow.

November 7, 2020 - An upper-level trough brought notable lower elevation rain and mountain snow across Southern California from November 7th - 9th. The cold nature of the system also brought chilly temperatures to the region, especially in areas of the High Desert. Portions of the mountains in San Diego County received significant snowfall. Mount Laguna measured a total of 7 inches, while Palomar Mountain measured 4 inches of snow.

February 23, 2022 - A potent trough of low pressure from the Pacific brought cold weather across the region. The region also saw some lower elevation snowfall with higher elevations receiving over one foot of snow. Record cold temperatures and highway closures were the main impacts as this system swept through the region from February 21st to 23rd. Many areas saw temperatures lowering into the 20s and 30s.

Julian dropped to 18 degrees on the 24th and Lake Cuyamaca broke a daily record low of 12 degrees on the 25th.

The Storm Events Database collects information on each event from a variety of sources, including but not limited to, county, state, and federal emergency management officials, newspaper clipping services, and the insurance industry. A review of the Storm Events Database for events in San Diego County also showed 212 records related to heavy snow, heavy rain, frost/freeze, and high wind. The following table summarizes the events recorded in the NCEI database.

TABLE 20: NCEI SEVERE WINTER WEATHER EVENTS REPORTED FOR SAN DIEGO COUNTY, OCTOBER 1, 2017 – DECEMBER 31, 2022

Event Type	Location	# of Events	Property Damage ($)	Deaths
Heavy Snow	San Diego County Mountains	13	$100,000	0
	San Diego County Valleys	1	0	0
Heavy Rain	San Diego County	68	0	0
Frost/Freeze	San Diego County Valleys	5	0	0
	San Diego County Deserts	1	0	0
	San Diego County Coastal Areas	1	0	0
High Wind	San Diego County Mountains	97	$31,000	0
	San Diego County Valleys	19	$30,000	0
	San Diego County Deserts	5	0	0
	San Diego County Coastal Areas	2	0	0
	Total	**212**	**$161,000**	**0**

Source: NCEI, Storm Events Database

Hazard Impacts

The most common problems associated with severe winter storms are immobility and loss of utilities. Fatalities are uncommon but can occur. Roads may become impassable due to flooding, downed trees, or a landslide. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Heavy rain can have significant impacts, including flash flooding and landslides. Stormwater runoff from heavy rains can also impair water quality by washing pollutants into water bodies. During winter storms, transboundary flows of raw sewage and urban runoff increase at the Tijuana River along the U.S-Mexico border, which results in beach advisories and closures along San Diego's coastal beaches due to unsafe bacteria levels that may cause illnesses.

Late or early freeze events can have a devastating effect on agriculture of the region. Crops can be damaged by below-freezing temperatures. Prolonged exposure to cold can cause frostbite or hypothermia and can be life-threatening. Infants and the elderly are most susceptible. Of significant concern is the impact to populations with special needs and those requiring the use of medical equipment. The residents of nursing homes and elder care facilities are especially vulnerable to extreme temperature events. In addition to vulnerable populations, pets and livestock are at risk to freeze and cold. Pipes may freeze and burst in homes or buildings that are poorly insulated or without heat.

Location & Extent/Probability of Occurrence & Magnitude

A marked feature of San Diego's climate is the wide variation in temperature within short distances. In nearby valleys, nights are noticeably cooler in the winter, and freezing occurs much more frequently compared to urban areas of the County. Although records show unusually small daily temperature ranges, only about 15 degrees between the highest and lowest readings, a few miles inland these ranges increase to 30 degrees or more.

The seasonal rainfall is about 10 inches in coastal areas but increases with elevation and distance from the coast. In the mountains to the north and east, the average rainfall is between 20 and 40 inches, depending on slope and elevation. Most of the precipitation falls in winter, except in the mountains where there is an occasional thunderstorm. Eighty-five percent of the rainfall occurs from November through March, but wide variations take place in monthly and seasonal totals.

Due to the County of San Diego's history of severe winter weather events, severe winter weather in the County of San Diego is "Highly Likely" to continue to occur, meaning 90 to 100 percent probability of occurrence in the next year or a recurrence interval of 1 to 10 years. According to the NCEI Weather Database, there have been 14 heavy snow events, 68 heavy rain events, 7 frost freeze events, and 123 high wind events, which total up to 212 severe winter weather events in the County of San Diego's Valleys, Deserts, and Coastal Areas between October 1, 2017 and December 31, 2022. This means there is a 11% chance on any given day of a severe winter weather event occurring over the course of a year.

Climate Change Considerations

Severe winter weather events are going to become more extreme regarding climate change effects. These events are primarily atmospheric rivers and will become more so in the future based on global climate models (Gershunov et al., 2019).

The highest priority mitigation actions to reduce climate change impacts on this hazard should include preparation, with strong attention to weather forecasts and available social services, infrastructure (e.g., Warming Centers), and programs to support installation of backup power supplies to address power failure during times of extreme cold and freeze.

5.2.14. ALL-HAZARD EVACUATIONS

Evacuation is a process by which people must move from a place where there is immediate or anticipated danger, to a place of safety, and offered appropriate and accessible temporary shelter facilities. A decision to evacuate areas will be made through Unified Command. Law enforcement agencies are the primary lead for evacuation activities, with other agencies playing supporting roles. The overarching goal of evacuation planning in San Diego County is to maximize the preservation of life while reducing the number of people that must evacuate and the distance they must travel to seek refuge.

The County of San Diego Operational Area Emergency Operations Plan's (OA EOP's) Annex Q (Evacuation Annex) is written in coordination with this plan, and describes how emergency personnel will cooperate, decide, and implement responses to a disaster that requires an evacuation of people and their pets. The OA EOP Evacuation Annex aims to lessen the impact a large-scale evacuation can have on the host communities by providing estimates for the number of people who may require sheltering or transportation assistance and the estimated number of pets that may need to be evacuated. [139]

Legal Considerations

It is important to note evacuation strategies, routes, and locations may vary due to the type, severity, movement, and other unique features of a hazard. For example, the maps below can be used to evacuate during a Tsunami hazard:

[139] San Diego County Emergency Operations Plan

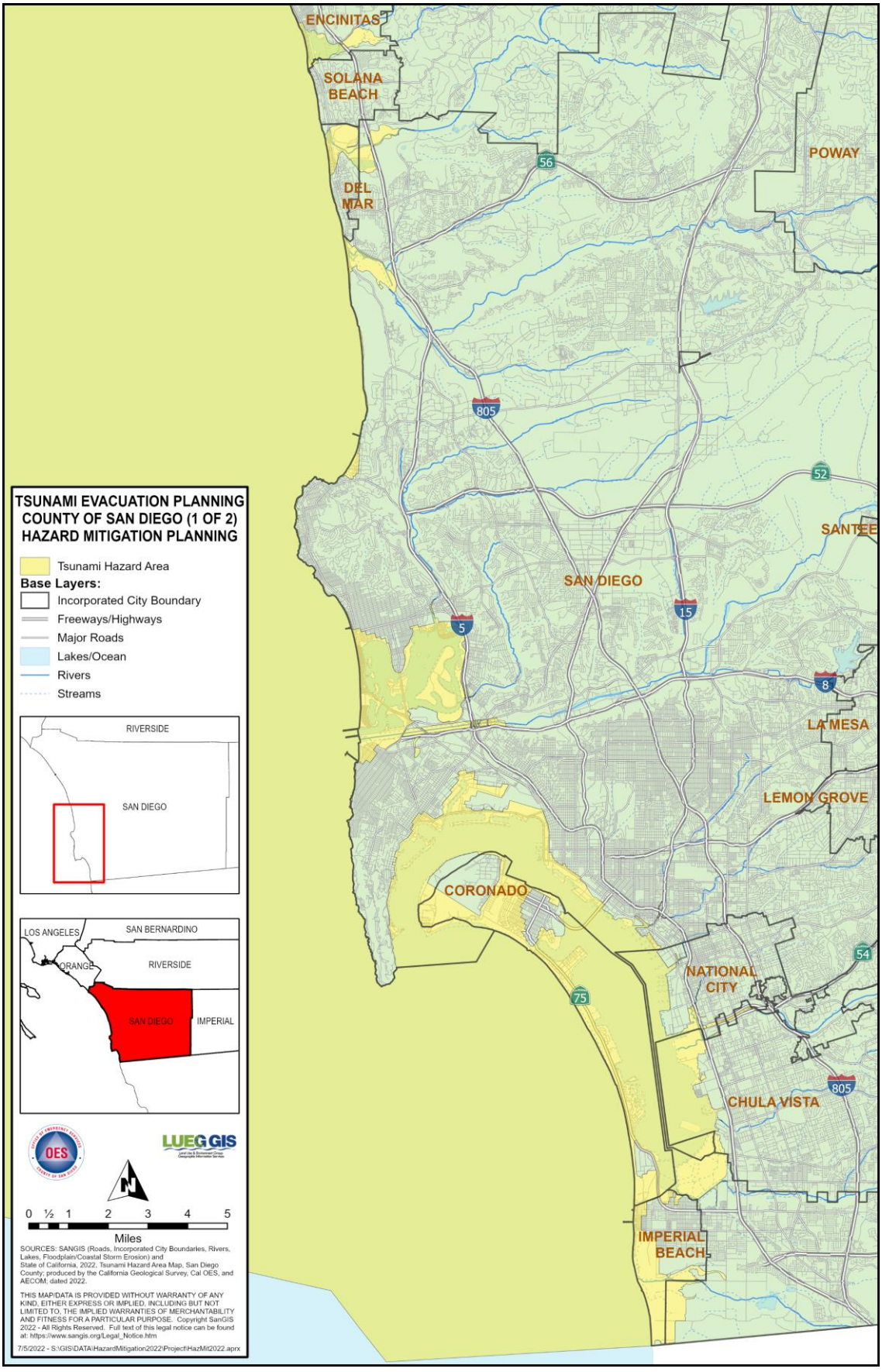


FIGURE 19: COUNTY OF SAN DIEGO, TSUNAMI EVACUATION MAP 1

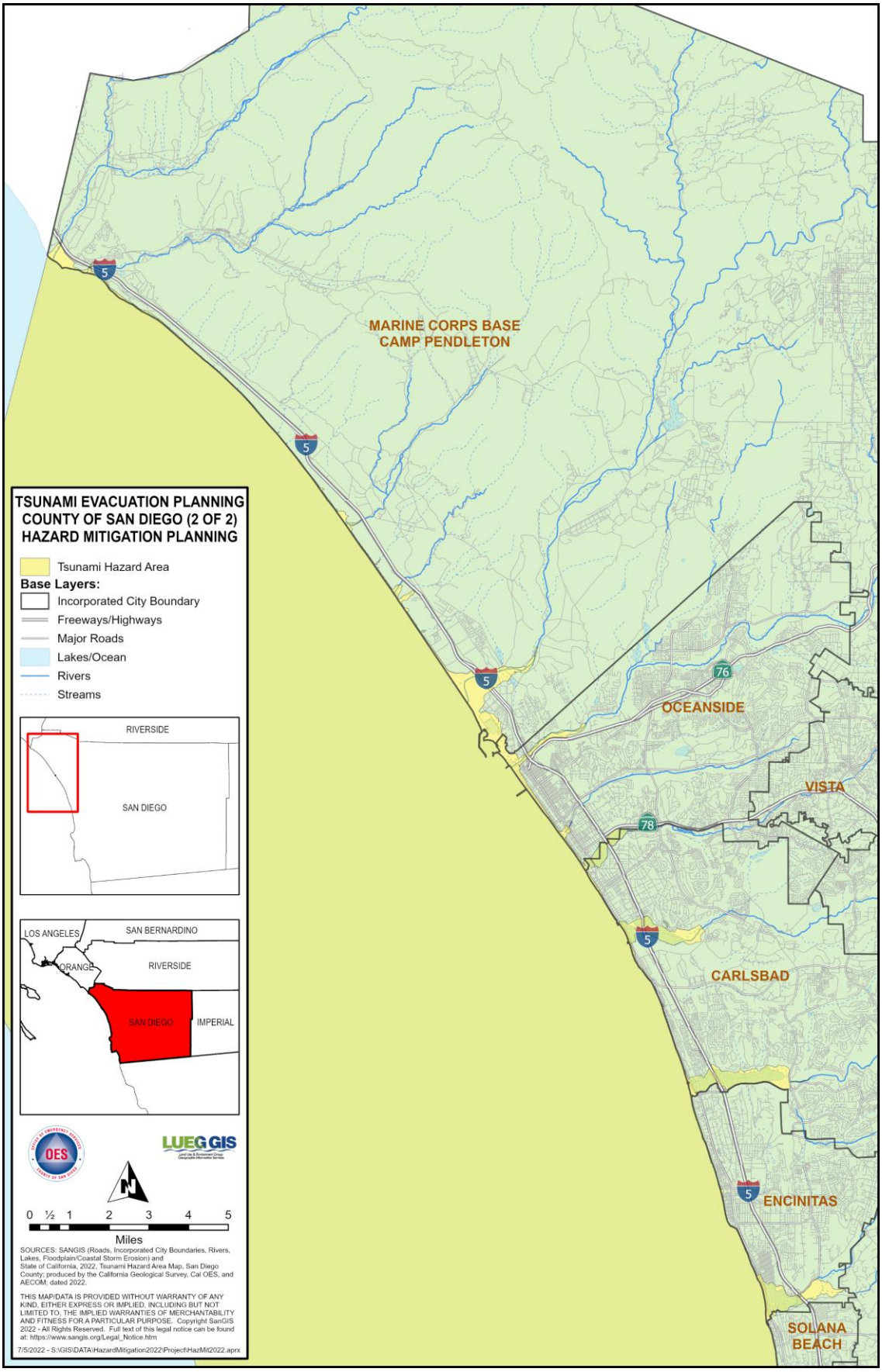


FIGURE 20: COUNTY OF SAN DIEGO, TSUNAMI EVACUATION MAP 2

The EOP Evacuation Annex provides hazard specific considerations, general evacuation transportation routes and capacities, evacuation resources available locally and through mutual aid, and disability and access and functional needs considerations. [140]

Evacuation orders should be issued when there is a clear and immediate threat to the health and safety of the population, and it is determined that evacuation is the best option for protection. The State of California, San Diego County, and the jurisdictions within, through the Unified Disaster Council, have agreed to use the language below, as described in FireScope, to communicate evacuations:

Evacuation Warning: The alerting of people in an affected area(s) of potential threat to life and property. An Evacuation Warning considers the probability that an area will be affected within a given time frame and prepares people for a potential evacuation order. Evacuation Warnings are particularly necessary when dealing with a variety of issues such as special needs populations and large animals.

Evacuation Order: Requires the immediate movement of people out of an affected area due to an imminent threat to life.

Shelter-In-Place: Advises people to stay secure at their current location. This tactic shall only be used if an evacuation will cause a higher potential for loss of life. Consideration should be given to assigning incident personnel to monitor the safety of those remaining in place. The concept of shelter-in-place is an available option in those instances where physical evacuation is impractical. This procedure may be effective for residential dwellings in the immediately impacted areas, or for large facilities that house a high percentage of non-ambulatory persons (e.g., hospitals and convalescent homes). Sheltering-in-place attempts to provide a safe haven within the impacted area.

In 2005, the Chief Legal Counsel for the San Diego Sheriff's Department maintained an opinion based on case law that Penal Code Section 409.5 does not authorize forcible or mandatory evacuations. The Chief Legal Counsel stated, "without a specific legislative amendment to Penal Code Section 409.5, it would be improper to infer statutory authority to forcibly evacuate people who do not wish to be evacuated, unless their presence in the closed area, resulted from an entry made after the area was closed pursuant to 409.5(a) or 409.5(b)." See Attachment 4 for Penal Code 409.5.

Emergency responders shall make every effort to inform people that failure to evacuate may result in serious physical injury or death and that future opportunities to evacuate may not exist. Law enforcement will document the location of individuals that refuse to evacuate. Once, Unified Command orders an evacuation, it is critical that public information dissemination, sheltering resources, and security and protection of private property are provided to a level where the public feels evacuation is more desirable than staying behind.

This plan specifically provides a condensed version of potential evacuation routes and temporary evacuation locations to be used under a range of emergency scenarios. However, during a true hazard, please be advised Unified Command and law enforcement instructions are subject to change depending on hazard types and conditions.

[140] San Diego County Emergency Operations Plan

Evacuation Routes:

Evacuations that must be conducted during the standard working commuting hours will severely impact evacuation routes. If possible, alternate routes should be used or contraflow methods should be explored.

The following maps show the major highways within the San Diego OA and the most congested segments of those highways during the morning and evening commutes.

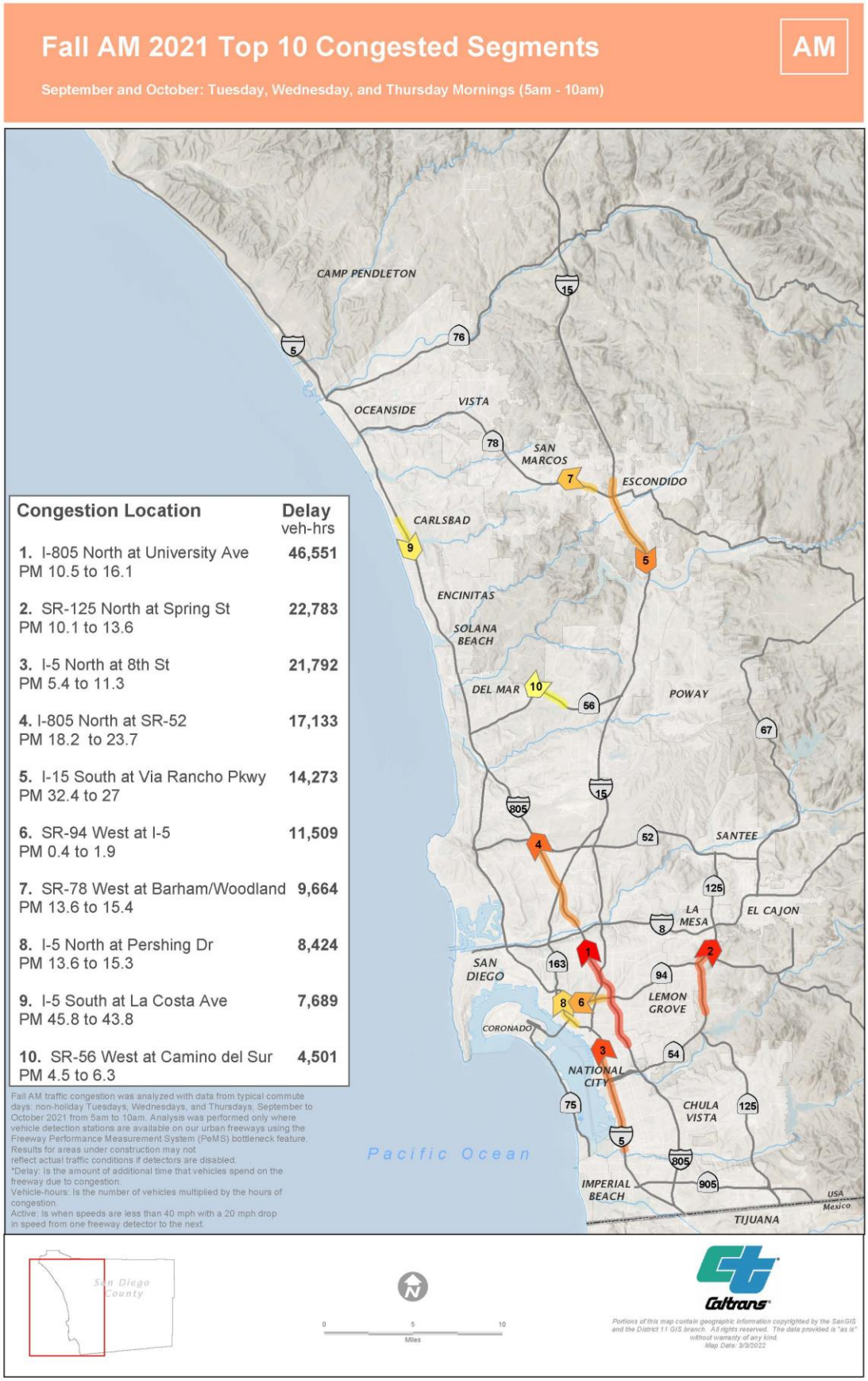


FIGURE 21: SAN DIEGO COUNTY 2021 TOP 10 MORNING CONGESTED SEGMENTS

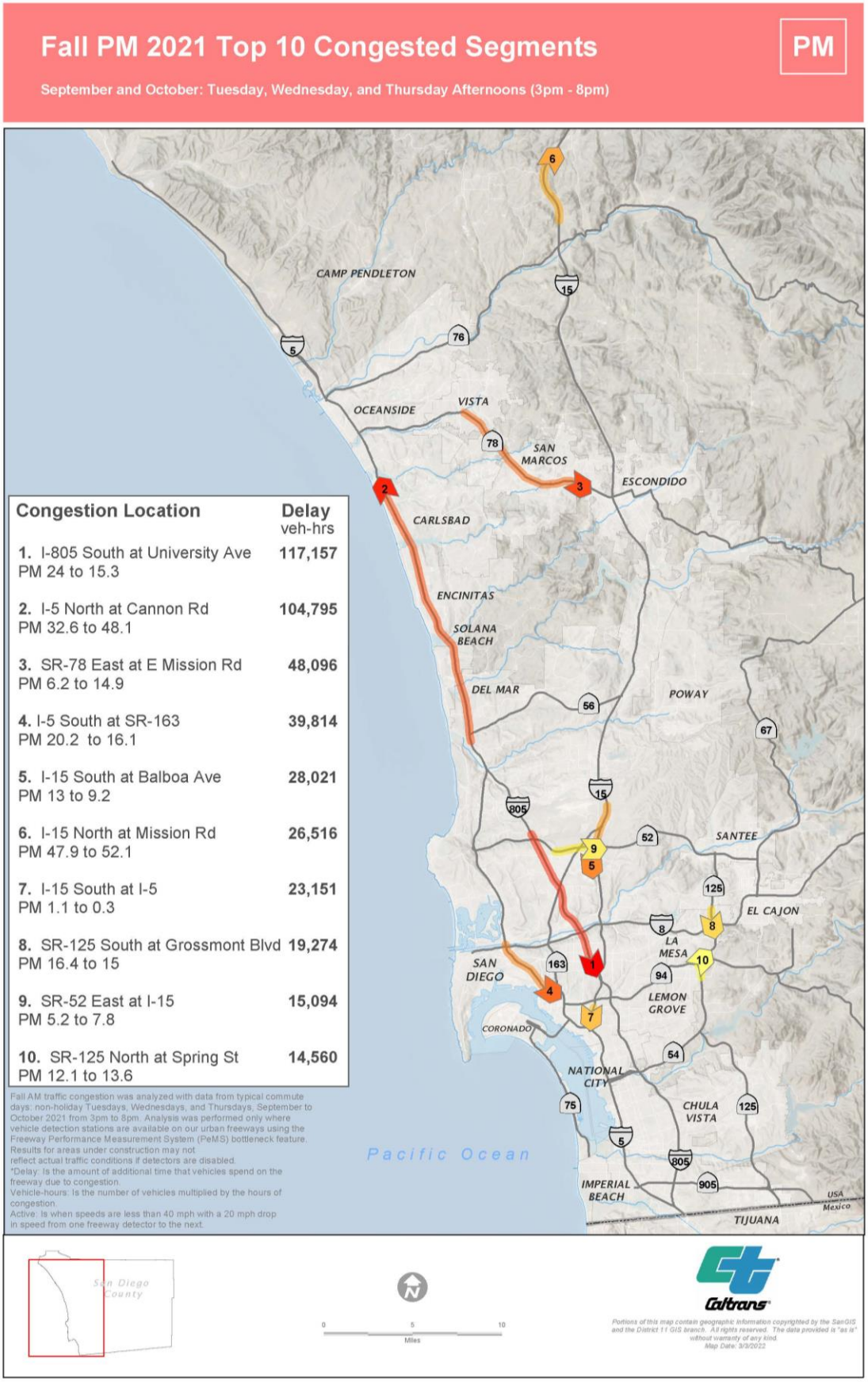


FIGURE 22: SAN DIEGO COUNTY 2021 TOP 10 AFTERNOON CONGESTED SEGMENTS

Temporary Evacuation Points & Sheltering

When law enforcement implements an evacuation order, they will coordinate with the Unified Command to decide on a location to use as a Temporary Evacuation Point (TEP). A TEP is a site with limited resources and staffing, as its primary purpose is to provide evacuees with a safe and protected place to congregate temporarily until people can return home or relocate to another facility. TEP location choices are situationally dependent, but can be places like a school, community center, or church.

The Operational Area Emergency Operations Center (OA EOC), along with the OA EOC Care & Shelter Branch, will coordinate the locations to be used as emergency shelters if necessary. The OA EOC staff may assist, as requested, in the coordination of an evacuation in an incorporated city. The San Diego Sheriff's Department Dispatch Center, in conjunction with the OA EOC and Joint Information Center (JIC), will utilize the AlertSanDiego system, social media, radio, television, IPAWS, etc. to direct evacuees to the established TEP or shelter. Local jurisdictions all have access to the same alert and warning tools as the OA and should follow their internal protocols for sharing information with the public.

TEPs will serve as temporary safe zones for evacuees, but they generally do not provide any services, such as food, water, restrooms, etc. Emergency shelters are opened when at least one overnight stay is necessary. Basic services are provided at emergency shelters, which includes meals, accessible shower facilities, dormitory management, health, and behavioral health services. Some temporary evacuation points may be suitable to be converted into an emergency shelter location, if necessary and available.

When overnight sheltering is required, Annex G: Care and Shelter Operations of the County of San Diego Operational Area Emergency Operations Plan (OA EOP) will be activated. [141]

5.3. 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 each 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.

The vulnerability assessment for this plan was conducted by the County of San Diego Land Use and Environment Group's Geographic Information Systems staff (listed in Section 2).

All planning participants were requested by County OES to provide feedback on assessment data and attest to respective jurisdictional accuracy on November 10, 2021 via electronic communication.

5.3.1. 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 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.

[141] Ibid

The figure in the next subsection shows the critical facilities identified for the County. The critical facilities identified in San Diego County include:

- hospitals and other health care facilities
- emergency operations facilities
- fire stations
- police stations
- schools
- hazardous material sites
- transportation systems that include airport facilities, bridges, bus and rail facilities
- marinas and port facilities
- highways
- utility systems that include electric power facilities, natural gas facilities, crude and refined oil facilities, potable and wastewater facilities, and communications facilities and utilities
- dams
- government office/civic centers, jails, prisons, military facilities, religious facilities, and post offices.

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 4,261 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.[142] The hazards addressed are described in the previous section.

5.3.2. ESTIMATING POTENTIAL EXPOSURE & 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
- Wildfire/Structure fire
- Dam failure
- Landslide
- Human-caused 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 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.

[142] https://www.sandiegocounty.gov/content/dam/sdc/auditor/pdf/adoptedplan_21-23.pdf

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.

The table below provides abbreviations and average replacement costs used for critical facilities and infrastructure listed in all subsequent exposure/loss tables. The table provides the total inventory and exposure estimates for the critical facilities and infrastructure by jurisdiction and shows the estimated exposure inventory for infrastructure by jurisdiction. The table also provides an inventory of the maximum population and building exposure by jurisdiction.

Loss was also 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 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).

TABLE 21: ABBREVIATIONS AND COSTS USED FOR CRITICAL FACILITIES AND INFRASTRUCTURE

Abr.	Name	Building Type (where applicable)	Average Replacement Cost
AIR	Airport facilities - large	s1l	$14,416,100
BRDG	Highway Bridges	n/a	$6,670,000
BUS	Bus facilities	c1l	$1,830,000
COM	Communication facilities	c1l	$4,000,000
ELEC	Electric Power facility	c1l	$875,000,000
EMER	Emergency Centers, Fire Stations and Police Stations	c1l	$3,048,000
GOVT	Government Office/Civic Center	c1l	$3,048,000
HOSP	Medical Care facilities	s1m	$16,629,250
INFR	Kilometers of Infrastructure. Includes:		
	Oil/Gas Pipelines (OG)	n/a	$683,000
	Railroad Tracks (RR)	n/a	$1,500,000
	Highway (HWY)	n/a	$6,668,000
PORT	Port facilities	c1l	20,000,000
POT	Potable and Wastewater facilities	c1l	$193,611,700
RAIL	Rail facilities	c1l	$3,000,000
SCH	Schools	rm1l	$74,400 / Student

TABLE 22: INVENTORY OF CRITICAL FACILITIES AND EXPOSURE VALUE BY JURISDICTION

Jurisdiction	Data (x1000)	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	37	0	0	1	2	3	0	0	0	5	48
	Exposure	0	246,790	0	0	47,000	6,096	9,144	0	0	0	133,644	442,674
Carlsbad	Number	1	46	0	0	7	10	11	0	0	5	21	101
	Exposure	4,377,391	26,162,610	0	0	100,173,000	1,520,952	33,528	0	0	1,884,447	1,274,946	135,426,874
Chula Vista	Number	0	66	4	0	8	16	18	2	0	1	70	185
	Exposure	0	25,905,350	7,320	0	98,705,000	1,530,096	54,864	33,259	0	30,000	156,709,430	282,975,319
Coronado	Number	0	2	0	1	3	3	5	1	0	0	4	19
	Exposure	0	13,340	0	4,000	141,000	1,304,544	15,240	16,629	0	0	225,996	1,720,749
Del Mar	Number	0	6	0	0	0	3	4	0	0	0	0	13
	Exposure	0	25,484,190	0	0	0	234,696	12,192	0	0	0	0	25,731,078
El Cajon	Number	1	59	3	0	8	12	17	0	0	0	34	134
	Exposure	4,368,696	393,530	5,490	0	97,378,000	1,539,240	51,816	0	0	0	153,980,088	257,716,860
Encinitas	Number	0	17	0	0	1	7	10	1	0	1	12	49
	Exposure	0	111,490	0	0	47,000	21,336	30,480	16,629	0	163,612	579,494	27,204,413
Escondido	Number	0	78	0	1	11	12	17	1	0	2	35	157
	Exposure	0	24,980,140	0	4,000	96,004,000	1,539,240	51,816	16,629	0	2,151,670	2,129,942	126,877,437
Imperial Beach	Number	0	0	0	0	0	2	5	0	0	0	5	12
	Exposure	0	0	0	0	0	1,252,728	15,240	0	0	0	289,784	1,557,752
La Mesa	Number	0	44	2	0	2	5	6	1	0	0	14	74
	Exposure	0	23,734,770	3,660	0	90,302,000	1,548,384	18,288	16,629	0	0	668,146	116,291,877
Lemon Grove	Number	0	15	0	0	1	3	5	0	0	0	5	29
	Exposure	0	23,460,350	0	0	47,000	1,548,384	15,240	0	0	0	208,236	25,279,210
National City	Number	0	65	0	0	6	5	7	1	0	0	15	99
	Exposure	0	23,407,010	0	0	282,000	1,548,384	21,336	16,629	0	0	919,450	26,194,809
Oceanside	Number	1	46	1	2	4	16	19	1	0	2	37	129
	Exposure	3,501,640	23,054,470	1,830	8,000	89,897,000	1,554,480	57,912	16,629	0	327,223	149,017,722	267,436,906
Otay Water District	Number	0	85	1	15	16	20	15	1	0	2	65	220
	Exposure	0	566,950	1,830	60,000	4,892,000	60,960	45,720	16,629	0	193,612	10,820,428	16,658,129
Poway	Number	0	51	0	0	4	4	4	1	0	8	10	82
	Exposure	0	340,170	0	0	188,000	1,219,200	12,192	16,629	0	1,290,000	666,962	3,733,153

TABLE 22: INVENTORY OF CRITICAL FACILITIES AND EXPOSURE VALUE BY JURISDICTION

Jurisdiction	Data (x1000)	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Padre Dam Municipal Water District	Number	1	145	0	0	3	11	11	0	0	1	28	200
	Exposure	263,077	967,150	0	0	141,000	33,528	33,528	0	0	163,612	8,060,450	9,662,345
Port of San Diego	Number	1	3	0	0	3	7	4	0	1	0	0	19
	Exposure	300,604	19,060	0	0	969,000	21,336	12,192	0	719,793	0	0	2,041,985
Rainbow Municipal Water District	Number	0	43	0	1	3	4	2	0	0	2	4	59
	Exposure	0	286,810	0	4,000	1,797,000	12,192	6,096	0	0	60,000	150,590	2,316,688
Rancho Santa Fe FPD	Number	0	26	0	0	5	4	5	0	0	8	6	54
	Exposure	0	173,420	0	0	1,063,000	12,192	15,240	0	0	1,008,059	310,874	2,582,785
San Diego (City)	Number	3	625	12	34	82	108	150	9	2	9	309	1,343
	Exposure	4,330,939	20,479,000	21,960	716,000	83,721,000	1,767,840	457,200	149,663	726,492	5,579,457	150,957,410	268,906,961
San Diego County Water Authority	Number	6	1,592	24	70	182	285	346	18	2	52	722	3,299
	Exposure	1,540,729	10,541,690	43,920	280,000	44,986,000	868,680	1,054,608	299,327	726,493	4,900,293	92,015,670	157,257,409
San Marcos	Number	0	24	1	2	2	10	8	0	0	0	30	77
	Exposure	0	6,945,810	1,830	360,000	36,879,000	1,969,008	24,384	0	0	0	103,068,310	149,248,342
San Miguel FPD	Number	0	100	0	0	4	10	10	0	0	3	30	157
	Exposure	0	667,000	0	0	188,000	30,480	30,480	0	0	193,612	4,125,426	5,234,998
Santee	Number	0	50	0	1	1	3	7	0	0	1	11	74
	Exposure	0	333,500	0	4,000	47,000	914,400	21,336	0	0	163,612	682,576	2,166,424
Solana Beach	Number	0	4	0	0	0	1	4	0	0	0	4	13
	Exposure	0	26,680	0	0	0	3,048	12,192	0	0	0	113,146	155,066
Sweetwater Authority	Number	0	124	3	0	13	14	24	2	0	2	49	231
	Exposure	0	816,630	5,490	0	2,267,000	42,672	73,152	33,259	0	60,000	2,687,162	5,985,365
Unincorporated	Number	1	567	0	37	73	85	78	1	0	32	115	989
	Exposure	4,232,543	5,091,690	0	644,000	35,841,000	938,784	237,744	16,629	0	11,853,925	97,291,574	156,147,889
Vista	Number	0	15	1	0	2	13	9	0	0	0	22	62
	Exposure	0	1,285,990	1,830	0	94,000	2,054,352	27,432	0	0	0	1,124,726	4,588,330
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	2	6
	Exposure	0	25,730	0	0	0	0	0	0	0	0	91,464	117,194
Total Number		**16**	**3,993**	**53**	**176**	**451**	**684**	**819**	**40**	**5**	**137**	**1,705**	**8,079**
Total Exposure (x $1,000)		**22,915,619**	**245,521,320**	**95,1605**	**2,084,000**	**786,096,000**	**25,097,232**	**2,450,592**	**665,169**	**2,172,778**	**30,023,134**	**938,303,646**	**2,081,659,021**

TABLE 23: INVENTORY OF EXPOSURE FOR INFRASTRUCTURE

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	17	4	0	21
	Exposure (x$1,000)	113,472	2,733	0	116,205
Carlsbad	Total KMs	174	86	29	289
	Exposure (x$1,000)	1,163,163	58,835	43,115	1,265,113
Chula Vista	Number	317	51	33	401
	Exposure (x$1,000)	2,110,623	35,026	49,150,878	51,296,527
Coronado	Number	21	16	0	37
	Exposure (x$1,000)	137,016	10,978	0	147,994
Del Mar	Number	5	9	7	21
	Exposure (x$1,000)	30,511	6,004	10,641	47,156
El Cajon	Number	159	17	31	207
	Exposure (x$1,000)	1,057,030	11,600	46,337	1,114,967
Encinitas	Number	86	43	19	148
	Exposure (x$1,000)	571,714	29,244	28,656	629,614
Escondido	Number	180	28	11	219
	Exposure (x$1,000)	1,198,940	19,042	16,686	1,234,668
Imperial Beach	Number	5	4	0	9
	Exposure (x$1,000)	32,259	2,743	0	35,002
La Mesa	Number	123	15	32	170
	Exposure (x$1,000)	817,200	10,472	48,176	875,848
Lemon Grove	Number	46	6	14	66
	Exposure (x$1,000)	303,500	3,813	20,338	327,651
National City	Number	125	12	52	189
	Exposure (x$1,000)	833,696	8,201	77,996	919,893
Oceanside	Number	182	48	43	273
	Exposure (x$1,000)	1,210,567	32,856	65,118	1,308,541
Otay Water District	Number	180	75	0	255
	Exposure (x$1,000)	1,197,512	50,910	0	1,248,422

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water Distrct	Number	89	36	2	127
	Exposure (x1000)	595,562	24,590	2,980	623,132
Port of San Diego	Number	17	10	23	50
	Exposure (x1000)	112,487	6,870	34,301	153,658
Poway	Number	58	9	0	67
	Exposure (x$1,000)	385,406	6,350	0	391,756
Rainbow Municipal Water District	Number	98	0	0	98
	Exposure (x1000)	653,187	0	0	653,187
Rancho Santa Fe FPD	Number	10	0	0	10
	Exposure (x1000)	67,412	0	0	67,412
San Diego (City)	Number	1,388	352	336	2,076
	Exposure (x$1,000)	9,256,954	240,237	504,158	10,001,349
San Diego County Water Authority	Number	1,980	1,013	262	3,255
	Exposure (x1000)	13,205,512	691,636	392,470	14,289,618
San Marcos	Number	127	15	32	174
	Exposure (x$1,000)	845,959	10,039	47,874	903,872
San Miguel FPD	Number	64	40	0	104
	Exposure (x$1,000)	425,562	27,448	0	453,010
Santee	Number	101	14	2	117
	Exposure (x$1,000)	671,014	9,565	2,948	683,527
Solana Beach	Number	26	14	7	47
	Exposure (x$1,000)	175,461	9,854	9,903	195,218
Sweetwater Authority	Number	139	14	22	175
	Exposure (x$1,000)	924,810	9,817	33,488	968,115
Unincorporated	Number	1,895	269	197	2,361
	Exposure (x$1,000)	12,634,636	183,503	295,114	13,113,253
Vista	Number	91	23	18	132
	Exposure (x$1,000)	603,560	15,475	26,710	645,745
Vista Irrigation District	Number	9	3	1	13
	Exposure (x$1,000)	60,170	1,744	1,207	63,121

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Total Number		**7712**	**2,226**	**1,173**	**11,111**
Total Exposure (x $1,000)		**51,394,895**	**1,519,585**	**50,859,094**	**103,773,574**

TABLE 24: INVENTORY OF THE MAXIMUM POPULATION AND BUILDING EXPOSURE BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine FPD	14,696	5,901	2,292,539	494	149,361
Carlsbad	114,253	46,289	17,983,277	3,486	1,053,992
Chula Vista	268,920	82,581	32,082,719	4,967	1,501,772
Coronado	23,639	8,832	3,431,232	857	259,114
Del Mar	4,331	2,561	994,949	546	165,083
El Cajon	103,186	35,721	13,877,609	3,122	943,937
Encinitas	62,780	26,199	10,178,312	3,254	983,847
Escondido	151,300	49,864	19,372,164	2,903	877,722
Imperial Beach	27,315	9,677	3,759,515	421	127,289
La Mesa	59,556	25,248	9,808,848	2,048	619,213
Lemon Grove	26,802	9,454	3,672,879	606	183,224
National City	61,121	16,881	6,558,269	1,413	427,221
Oceanside	175,622	66,456	25,818,156	3,068	927,610
Otay Water District	226,413	67,755	26,322,818	2,841	858,976
Padre Dam Municipal Water District	103,846	38,130	14,813,505	2,830	855,651
Port of San Diego	22,191	8,297	3,223,385	485	146,640
Poway	49,701	16,881	6,558,269	1,590	480,737
Rainbow Municipal Water District	19,267	9,166	3,560,991	459	138,779
Rancho Santa Fe FPD	35,914	11,716	4,551,666	685	207,110
San Diego (city)	1,386,932	504,438	195,974,163	40,485	12,240,640
San Diego County Water Authority	3,201,964	1,123,341	436,417,979	84,686	25,604,812
San Marcos	95,355	29,930	11,627,805	1,869	565,092
San Miguel FPD	138,766	42,518	16,518,243	2,238	676,659
Santee	57,797	20,954	8,140,629	1,404	424,499
Solana Beach	13,356	6,196	2,407,146	1,229	371,588
Sweetwater Authority	194,873	58,293	22,646,831	5,263	1,591,268
Unincorporated	504,330	164,538	63,923,013	11,027	3,334,013
Vista	100,686	33,343	12,953,756	2,802	847,185
Vista Irrigation District	71,634	6,038	2,345,763	469	141,802
Total	**7,316,546**	**2,527,198**	**981,816,430**	**187,547**	**56,704,835**

5.3.3. COASTAL STORM/EROSION

FEMA FIRM flood hazard data compiled and digitized 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
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.

The table below 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 59,196 people may be at risk from coastal storm/coastal erosion hazards in San Diego County:

TABLE 25: POTENTIAL EXPOSURE FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Carlsbad	341	16	6,218	0	0
Chula Vista	0	0	0	0	0
Coronado	3,506	0	0	2	605
Del Mar	70	5	1,943	0	0
El Cajon	0	0	0	0	0
Encinitas	958	*108	*35,367	*4	*1,310
Escondido	0	0	0	0	0
Imperial Beach	1,570	50	19,430	1	302
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	10,038	0	0	0	0
Oceanside	662	5	1,943	2	605
Port of San Diego	7,667	0	0	1	302
Poway	0	0	0	0	0
San Diego (City)	9,322	4	1,554	3	907
San Diego County Water Authority	23,659	30	11,658	5	1,512
San Marcos	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	1,260	0	0	0	0
Unincorporated	143	0	0	0	0
Vista	0	0	0	0	0
Total	**59,196**	**110**	**42,746**	**14**	**4,233**

*Coastal Storm Data consistent with the Encinitas – Solana Beach Coastal Storm Damage Reduction Project

TABLE 26: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Alpine Union School District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Protection District													
San Diego (City)	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
San Diego County Water Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	0	0	0	0	1	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	1	0	0	**0**
Unincorporated	Number	0	0	0	0	0	0	0	0	1	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	1	0	0	**0**
Valley Center Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**3**
Total Exposure (x$1,000)		**0**	**$6,670**	**0**	**0**	**0**	**0**	**0**	**0**	**$1,439,586**	**0**	**0**	**$1,446,256**

TABLE 27: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM COASTAL STORM/EROSION HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	1	1	0	2
	Exposure (x$1,000)	4,860	22	0	4,882
Chula Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Coronado	Total KMs	2	3	0	5
	Exposure (x$1,000)	11,014	1,948	0	12,962
Del Mar	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
El Cajon	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Encinitas	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Escondido	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Imperial Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
La Mesa	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Lemon Grove	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
National City	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Oceanside	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Port of San Diego	Total KMs	1	0	1	2
	Exposure (x1000)	9,263	0	89	9,352
Poway	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Diego (City)	Total KMs	0	0	1	1
	Exposure (x$1,000)	0	0	89	89
San Diego County Water Authority	Total KMs	1	1	1	3
	Exposure (x1000)	4,860	22	89	4,971
San Marcos	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Santee	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Solana Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Unincorporated	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Total Number		**5**	**5**	**3**	**13**
Total Exposure (x $1,000)		**29,997**	**1,992**	**267**	**32,256**

5.3.4. SEA LEVEL RISE

TABLE 28: POTENTIAL EXPOSURE FROM SEA LEVEL RISE (COASTAL FLOODING) HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	622	21	$8,161	4	$1,209
Chula Vista	116	0	0	0	0
Coronado	1,750	112	$43,523	6	$1,814
Del Mar	790	52	$20,207	9	$2,721
El Cajon	0	0	0	0	0
Encinitas	316	1	$389	3	$907
Escondido	0	0	0	0	0
Imperial Beach	2,629	51	$19,819	11	$3,326
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	261	358	$139,119	51	$15,420
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	2,207	0	0	8	$2,419
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego (City)	5,490	108	$41,969	85	$25,700
San Diego County Water Authority	9,452	540	$209,844	153	$46,260
San Marcos	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	470	0	0	0	0
Unincorporated	0	0	0	1	302
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**24,103**	**1,243**	**$483,030**	**331**	**$100,078**

TABLE 29: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM SEA LEVEL RISE (COASTAL FLOODING) HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	$63,850	0	0	0	0	0	0	0	0	0	**$63,850**
Chula Vista	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$25,730	0	0	0	0	0	0	0	0	0	**$25,730**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	7	0	0	1	0	0	0	0	0	0	**8**
	Exposure (x$1,000)	0	$43,840	0	0	$47,000	0	0	0	0	0	0	**$90,840**
Oceanside	Number	0	2	0	0	0	1	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	$11,440	0	0	0	$3,048	0	0	0	0	0	**$14,488**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	6	0	0	0	0	0	0	1	0	0	**7**
	Exposure (x$1,000)	0	$37,170	0	0	0	0	0	0	$719,793	0	0	**$756,963**
San Diego County Water Authority	Number	0	35	0	0	1	1	0	0	0	0	0	**37**
	Exposure (x$1,000)	0	$218,250	0	0	$47,000	$3,048	0	0	0	0	0	**$268,298**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	8	0	0	1	0	0	0	0	0	0	**9**
	Exposure (x$1,000)	0	$50,510	0	0	$47,000	0	0	0	0	0	0	**$97,510**
Unincorporated	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$22,880	0	0	0	0	0	0	0	0	0	**$22,880**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number	**0**	**78**	**0**	**0**	**3**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	85
Total Exposure (x$1,000)	**0**	**$487,010**	**0**	**0**	**$141,000**	**$6,096**	**0**	**0**	**$1,439,586**	**0**	**0**	**$2,073,692**	

TABLE 30: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM SEA LEVEL RISE (COASTAL FLOODING) HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	14	3	1	**18**
	Exposure (x$1,000)	$94,146	$2,136	$832	**$97,114**
Chula Vista	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	$12,246	$314	0	**$12,560**
Coronado	Total KMs	16	2	0	**18**
	Exposure (x$1,000)	$107,332	$1,637	0	**$108,969**
Del Mar	Total KMs	3	2	1	**6**
	Exposure (x$1,000)	$16,696	$1,308	$1,635	**$19,639**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	6	3	1	**10**
	Exposure (x$1,000)	$37,359	$1,712	$690	**$39,761**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	0	0.2	0	**0.2**
	Exposure (x$1,000)	0	$145	0	**$145**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	6	0.2	3	**9.2**
	Exposure (x$1,000)	$43,304	$143	$5,131	**$48,578**
Oceanside	Total KMs	2	1	1	**4**
	Exposure (x$1,000)	$12,316	$398	$1,650	**$14,184**
Otay Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Padre Dam Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Port of San Diego	Total KMs	4	0.4	4	**8.4**
	Exposure (x1000)	$23,476	$276	$6,670	**$30,422**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	19	6	12	**37**
	Exposure (x$1,000)	$123,974	$3,786	$18,165	**$145,925**
San Diego County Water Authority	Total KMs	55	15	22	**92**
	Exposure (x1000)	$365,016	$10,363	$32,501	**$407,880**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Miguel Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	8	1	3	**12**
	Exposure (x$1,000)	$55,550	$457	$5,131	**$61,138**
Unincorporated	Total KMs	4	1	3	**8**
	Exposure (x$1,000)	$24,975	$565	$4,398	**$29,938**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**140**	**36**	**51**	**226**
Total Exposure (x $1,000)		**$916,390**	**$23,240**	**$76,854**	**$1,016,253**

TABLE 31: POTENTIAL EXPOSURE FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	70	1	$389	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	1	$302
Del Mar	0	0	0	0	0
El Cajon	0	0	0	0	0
Encinitas	0	1	$389	0	0
Escondido	0	0	0	0	0
Imperial Beach	0	0	0	1	$302
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	5,019	0	0	0	0
Oceanside	39	0	0	19	$5,745
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	11,560	0	0	4	$1,209
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego (City)	6,565	414	$160,880	83	$25,095
San Diego County Water Authority	12,250	416	$161,658	102	$30,840
San Marcos	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	0	0	0	0	0
Unincorporated	0	0	0	0	0
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**35,503**	**832**	**$323,316**	**210**	**$64,493**

TABLE 32: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	$24,780	0	0	0	0	0	0	0	0	0	**$24,780**
Chula Vista	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$6,670	0	0	0	0	0	0	0	0	0	**$6,670**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	$31,450	0	0	0	0	0	0	0	0	0	**$31,450**
Oceanside	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	$5,720	0	0	0	0	0	0	0	0	0	**$5,720**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	1	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	$719,793	0	0	**$719,793**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	13	0	0	0	0	0	0	1	0	0	**14**
	Exposure (x$1,000)	0	$82,910	0	0	0	0	0	0	$719,793	0	0	**$802,703**
San Diego County Water Authority	Number	0	26	0	0	0	0	0	0	0	0	0	**26**
	Exposure (x$1,000)	0	$162,970	0	0	0	0	0	0	0	0	0	**$162,970**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	$38,120	0	0	0	0	0	0	0	0	0	**$38,120**
Unincorporated	Number	0	2	0	0	0	0	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	$11,440	0	0	0	0	0	0	0	0	0	**$11,440**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**58**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**60**
Total Exposure (x$1,000)		**0**	**$364,060**	**0**	**0**	**0**	**0**	**0**	**0**	**$1,439,586**	**0**	**0**	**$1,803,646**

TABLE 33: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM SEA LEVEL RISE (MEAN HIGHER HIGH WATER) HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Carlsbad	Total KMs	1	2	0.1	3.1
	Exposure (x$1,000)	$5,223	$1,400	$161	$6,784
Chula Vista	Total KMs	1	0.2	0	1.2
	Exposure (x$1,000)	$5,230	$133	0	5,363
Coronado	Total KMs	4	0.4	0	4.4
	Exposure (x$1,000)	$29,021	$244	0	$29,265
Del Mar	Total KMs	0	0.9	0.05	1
	Exposure (x$1,000)	0	$581	$69	$650.00
El Cajon	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Encinitas	Total KMs	1	2	0.002	3
	Exposure (x$1,000)	$7,777	$1,171	$3	$8,951
Escondido	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Imperial Beach	Total KMs	0	0.1	0	0.1
	Exposure (x$1,000)	0	$91	0	$91
La Mesa	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Lemon Grove	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
National City	Total KMs	2	0.2	0.6	3
	Exposure (x$1,000)	$12,791	$131	$993	$13,915
Oceanside	Total KMs	0.2	0.4	0.1	0.7
	Exposure (x$1,000)	$1,399	$246	$174	$1,819
Otay Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Port of San Diego	Total KMs	10	2	0.4	12.4
	Exposure (x1000)	$64,513	$1,277	$543	$66,333
Poway	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Rainbow Municipal Water District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Diego (City)	Total KMs	23	5	1.3	29.3
	Exposure (x$1,000)	$155,836	$3,744	$2,047	$161,627
San Diego County Water Authority	Total KMs	29	11	2.3	42.3
	Exposure (x1000)	$193,145	$7,495	$3,948	$204,588
San Marcos	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
San Miguel Fire Protection District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Santee	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Solana Beach	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Sweetwater Authority	Total KMs	3	0.4	0.7	4.1
	Exposure (x$1,000)	$18,021	$265	$993	$19,279
Unincorporated	Total KMs	0.7	0.1	0.3	1.1
	Exposure (x$1,000)	$4,890	$89	$503	$5,482
Vista	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0
Vista Irrigation District	Total KMs	0	0	0	0
	Exposure (x$1,000)	0	0	0	0

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Total Number		**75**	**25**	**6**	**106**
Total Exposure (x $1,000)		**$497,846**	**$16,867**	**$9,434**	**$524,147**

5.3.5. TSUNAMI

Tsunami maximum run-up projections (second-generation) were modeled for the entire San Diego County coastline by the University of Southern California, and distributed by the CA Office of Emergency Services in 2009. 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
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.

The first table below provides a breakdown of potential exposure by jurisdiction, and the second table below provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction. It is important to note the California Geological Survey (CGS) and the California Governor's Office of Emergency Services (Cal OES) are in the process of generating the third generation of statewide tsunami inundation maps for evacuation planning. [143]

Approximately 169,606 people may be at risk from the tsunami hazard in San Diego County:

[143] https://www.conservation.ca.gov/cgs/Documents/Tsunami/Tsunami-inundation-map-methodology-2019.pdf

TABLE 34: POTENTIAL EXPOSURE FROM TSUNAMI HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Carlsbad	4,259	114	44,300	1	302
Chula Vista	228	0	0	0	0
Coronado	24,603	3,043	1,182,509	103	311,420
Del Mar	1,173	532	206,735	25	75,587
El Cajon	0	0	0	0	0
Encinitas	2,536	3	1,165	10	3,023
Escondido	0	0	0	0	0
Imperial Beach	8,019	2,068	803,624	94	284,209
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	10,156	0	0	0	0
Oceanside	3,599	1,401	544,428	53	160,245
Port of San Diego	13,917	0	0	3694	1,191,259
Poway	0	0	0	0	0
San Diego (City)	34,592	5,749	2,234,061	875	2,645,562
San Diego County Water Authority	58,040	7,799	3,030,691	956	2,890,466
San Marcos	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	1,411	0	0	0	0
Sweetwater Authority	5,078	0	0	0	0
Unincorporated	1,965	0	0	1	3,023
Vista	0	0	0		
Vista Irrigation District	0	0	0	0	0
Total	**169,606**	**20,709**	**8,047,517**	**2,503**	**7,567,820**

TABLE 35: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM TSUNAMI HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)		0										**0**
Carlsbad	Number	0	12	0	0	0	0	0	0	0	0	0	**12**
	Exposure (x$1,000)		77,190										**77,190**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Coronado	Number	0	1	0	1	0	1	1	0	0	0	1	**5**
	Exposure (x$1,000)	0	6,670	0	2,000	0	3,048	3,048	0	0	0	26,640	**41,406**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	2	0	0	0	0	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	12,390	0	0	0	0	0	0	0	0	0	**12,390**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	6	0	0	0	0	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	38,120	0	0	0	0	0	0	0	0	0	**38,120**
Oceanside	Number	0	5	0	0	0	1	0	0	0	0	0	**6**
	Exposure (x$1,000)	0	32,400	0	0	0	3,048	0	0	0	0	0	**35,448**
Otay Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	1	0	1	0	0	**2**
	Exposure (x1000)	0	0	0	0	0	0	3,048	0	719,793	0	0	**722,841**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water Distrct	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego (City)	Number	0	12	0	0	0	0	0	0	1	0	0	**13**
	Exposure (x$1,000)	0	78,140	0	0	0	0	0	0	719,793	0	0	**797,933**
San Diego County Water Authority	Number	0	44	0	0	0	3	0	0	1			**48**
	Exposure (x1000)	0	280,180	0	0	0	9,144	0	0	719,793	0	0	**1,009,117**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
	Number	0	6	0	0	0	0	0	0	0	0	0	**6**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Sweetwater Authority	Exposure (x$1,000)	0	38120	0	0	0	0	0	0	0	0	0	**38,120**
Unincorporated	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	22,880	0	0	0	0	0	0	0	0	0	**22,880**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**95**	**0**	**1**	**0**	**7**	**2**	**0**	**3**	**0**	**1**	**109**
Total Exposure (x $1,000)		**0**	**605,150**	**0**	**2,000**	**0**	**21,336**	**6,096**	**0**	**2,159,379**	**0**	**26,640**	**2,782,481**

TABLE 36: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM TSUNAMI HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	8	3	1	**12**
	Exposure (x$1,000)	52,405	1,848	1,291	**55,544**
Chula Vista	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,324	0	0	**2,324**
Coronado	Total KMs	45	9	0	**54**
	Exposure (x$1,000)	298,630	6,325	0	**304,955**
Del Mar	Total KMs	3	2	1	**6**
	Exposure (x$1,000)	20,014	1,590	1,707	**23,311**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	6	2	1	**9**
	Exposure (x$1,000)	39,063	1,045	1,642	**41,750**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	7,824	424	0	**8,248**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	3	0	1	**4**
	Exposure (x$1,000)	18,753	0	435	**19,188**
Oceanside	Total KMs	2	1	1	**4**
	Exposure (x$1,000)	15,911	466	974	**17,351**
Port of San Diego	Total KMs	2	1	0	**3**
	Exposure (x1000)	9,759	322	0	**10,081**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	25	8	1	**34**
	Exposure (x$1,000)	165,169	5,570	1,237	**171,976**
San Diego County Water Authority	Total KMs	49	16	6	**71**
	Exposure (x1000)	326,623	10,685	9,859	**347,167**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	1	**1**
	Exposure (x$1,000)	0	0	122	**122**
Sweetwater Water Authority	Total KMs	3	0	1	**4**
	Exposure (x$1,000)	21,077	0	435	**21,512**
Unincorporated	Total KMs	2	1	2	**5**
	Exposure (x$1,000)	12,983	165	2,452	**15,600**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**150**	**44**	**16**	**210**
Total Exposure (x $1,000)		**990,535**	**28,440**	**20,154**	**1,039,129**

5.3.6. 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 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
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.

The first table below provides a breakdown of potential exposure by jurisdiction, and the second table provides a breakdown of potential exposure to infrastructure and critical facility by jurisdiction.

Approximately 538,132 people are at risk from a dam failure hazard.

TABLE 37: POTENTIAL EXPOSURE FROM DAM FAILURE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine FPD	90	4	1,554	0	0
Carlsbad	1,258	523	203,238	24	7,256
Chula Vista	15,822	2,297	892,614	628	189,876
Coronado	2,275	392	152,331	5	1,512
Del mar	1,260	556	216,062	31	9,373
El Cajon	70	0	0	24	7,256
Encinitas	1,026	309	120,077	106	32,049
Escondido	34,783	11,624	4,517,086	969	292,977
Imperial beach	4,341	795	308,937	24	7,256
La Mesa	129	7	2,720	1	302
Lemon Grove	0	0	0	0	0
National City	7,603	275	106,865	148	44,748
Oceanside	25,060	8,449	3,283,281	318	96,147
Otay Water District	3,839	761	295,725	173	52,307
Padre Dam Municipal Water District	28,878	10,803	4,198,046	1191	360,099
Port of San Diego	7,034	0	0	48	14,513
Poway	0	7	2,720	3	907
Rainbow Municipal Water District	2,418	827	321,372	46	13,908
Rancho Santa Fe FPD	2,988	821	319,041	82	24,793
San Diego	89,183	32,128	12,484,941	4597	1,389,903
San Diego County Water Authority	234,032	76,679	29,797,459	8983	2,716,010
San Marco	660	119	46,243	4	1,209
San Miguel FPD	1,590	583	226,554	149	45,050
Santee	24,193	10,034	3,899,212	1084	327,747
Solana Beach	206	332	129,015	13	3,931
Sweetwater Authority	9,995	3,350	1,301,810	993	300,234
Unincorporated	36,492	10,189	3,959,445	1076	325,329
Vista	0	0	0	0	0
Vista Irrigation District	33	0	0	0	0
Total	**535,258**	**171,864**	**66,786,348**	**20,720**	**6,264,692**

TABLE 38: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM DAM FAILURE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	4	0	0	0	1	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	26,680	0	0	0	3,048	0	0	0	0	0	**29,728**
Chula Vista	Number	0	20	0	0	3	0	1	0	0	1	0	**25**
	Exposure (x$1,000)	0	130,550	0	0	969,000	0	9,144	0	0	30,000	0	**1,138,694**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	1	8	0	0	0	1	0	0	0	0	0	**10**
	Exposure (x$1,000)	257,356	53,360	0	0	0	3,048	0	0	0	0	0	**313,764**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	38	0	0	4	4	14	0	0	1	4	**65**
	Exposure (x$1,000)	0	251,560	0	0	1,016,000	12,192	42,672	0	0	163,612	302,882	**1,788,918**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	39,220	**39,220**
La Mesa	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	41	0	0	0	0	3	0	0	0	1	**45**
	Exposure (x$1,000)	0	268,720	0	0	0	0	9,144	0	0	0	31,376	**309,240**
Oceanside	Number	1	13	0	0	0	4	2	0	0	1	4	**25**
	Exposure (x$1,000)	86,701	85,760	0	0	0	12,192	6,096	0	0	163,612	185,666	**540,027**
Otay Water District	Number	0	11	0	0	1	1	1	0	0	1	3	**18**
	Exposure (x$1,000)	0	73,370	0	0	47,000	3,048	3,048	0	0	163,612	355,200	**645,278**
Padre Dam Municipal Water District	Number	1	68	0	0	1	4	6	0	0	0	7	**87**
	Exposure (x$1,000)	257,356	453,560	0	0	47,000	12,192	18,288	0	0	0	440,004	**1,228,400**
Port of San Diego	Number	1	0	0	0	0	4	0	0	0	0	0	**5**
	Exposure (x$1,000)	281,772	0	0	0	0	12,192	0	0	0	0	0	**293,964**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	23	0	0	0	1	1	0	0	0	0	**25**
	Exposure (x$1,000)	0	153,410	0	0	0	3,048	3,048	0	0	0	0	**159,506**
Rancho Santa Fe FPD	Number	0	12	0	0	2	1	0	0	0	3	1	**19**
	Exposure (x$1,000)	0	80,040	0	0	922,000	3,048	0	0	0	550,835	22,496	**1,578,419**
	Number	1	211	1	1	11	18	21	1	0	1	13	**279**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego (City)	Exposure (x$1,000)	271,772	1,394,070	1,830	2,000	1,345,000	54,864	64,008	16,629	0	163,612	682,650	**3,996,435**
San Diego County Water Authority	Number	2	483	1	4	24	41	57	1	0	11	41	**665**
	Exposure (x$1,000)	615,829	3,195,010	1,830	8,000	4,440,000	124,968	173,736	16,629	0	1,265,282	2,416,988	**12,258,272**
San Marcos	Number	0	0	0	0	1	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	47,000	0	0	0	0	0	0	**47,000**
San Miguel FPD	Number	0	6	0	0	0	1	0	0	0	1	0	**8**
	Exposure (x$1,000)	0	40,020	0	0	0	3,048	0	0	0	163,612	0	**206,680**
Santee	Number	0	48	0	0	1	3	6	0	0	0	6	**64**
	Exposure (x$1,000)	0	320,160	0	0	47,000	9,144	18,288	0	0	0	392,718	**787,310**
Sweetwater Authority	Number	0	74	0	0	2	2	7	0	0	1	3	**89**
	Exposure (x$1,000)	0	472,640	0	0	922,000	6,096	21,336	0	0	30,000	96,866	**1,548,938**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	119	0	3	6	7	8	0	0	11	13	**167**
	Exposure (x$1,000)	0	792,780	0	6,000	1,938,000	21,336	24,384	0	0	864,447	821,696	**4,468,643**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**7**	**1,192**	**2**	**8**	**57**	**95**	**127**	**2**	**0**	**32**	**97**	**1,619**
Total Exposure (x $1,000)		**1,770,786**	**7,849,820**	**3,660**	**16,000**	**11,740,000**	**289,560**	**393,192**	**33,258**	**0**	**3,558,624**	**5,787,762**	**31,442,662**

TABLE 39: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM DAM FAILURE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	23	2	0	**25**
	Exposure (x$1,000)	156,286	1,172	0	**157,458**
Chula Vista	Total KMs	114	5	2	**121**
	Exposure (x$1,000)	760,393	3,343	2,916	**766,652**
Coronado	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	5,992	273	0	**6,265**
Del Mar	Total KMs	6	3	1	**10**
	Exposure (x$1,000)	36,707	1,861	2,057	**40,625**
El Cajon	Total KMs	3	1	3	**7**
	Exposure (x$1,000)	17,455	446	4,602	**22,503**
Encinitas	Total KMs	17	5	1	**23**
	Exposure (x$1,000)	113,082	3,596	1,677	**118,355**
Escondido	Total KMs	88	2	6	**96**
	Exposure (x$1,000)	589,607	1,548	9,310	**600,465**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	5,498	861	0	**6,359**
La Mesa	Total KMs	6	1	1	**8**
	Exposure (x$1,000)	36,776	148	1,091	**38,015**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	76	1	7	**84**
	Exposure (x$1,000)	508,719	920	12,952	**522,591**
Oceanside	Total KMs	55	8	1	**64**
	Exposure (x$1,000)	365,206	5,322	328	**370,856**
Otay Water District	Total KMs	60	2	0	**62**
	Exposure (x1000)	400,397	1,311	0	**401,708**
Padre Dam Municipal Water District	Total KMs	131	13	5	**149**
	Exposure (x1000)	875,831	8,735	6,871	**891,437**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Port of San Diego	Total KMs	21	5	4	**30**
	Exposure (x1000)	138,956	3,467	5,662	**148,085**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	54	1	0	**55**
	Exposure (x$1,000)	359,258	183	0	**359,441**
Rancho Santa Fe FPD	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	13,612	293	0	**13,905**
San Diego (City)	Total KMs	821	61	51	**933**
	Exposure (x$1,000)	5,476,180	41,921	76,049	**5,594,150**
San Diego County Water Authority	Total KMs	1,511	115	77	**1,703**
	Exposure (x1000)	10,072,703	78,214	116,118	**10,267,035**
San Marcos	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	2,883	92	0	**2,975**
San Miguel FPD	Total KMs	32	1	0	**33**
	Exposure (x$1,000)	211,370	291	0	**211,661**
Santee	Total KMs	121	12	2	**135**
	Exposure (x$1,000)	810,110	8,192	2,269	**820,571**
Solana Beach	Total KMs	0	0	1	**1**
	Exposure (x$1,000)	0	0	311	**311**
Sweetwater Authority	Total KMs	188	8	11	**207**
	Exposure (x$1,000)	1,253,333	5,640	15,868	**1,274,841**
Unincorporated	Total KMs	239	16	2	**257**
	Exposure (x$1,000)	1,595,903	11,014	2,556	**1,609,473**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**3,571**	**266**	**175**	**4,012**
Total Exposure (x $1,000)		**23,806,257**	**178,843**	**260,637**	**24,245,737**

5.3.7. EARTHQUAKE/LIQUEFACTION

There was no FEMA HAZUS data available nor enough of any other data sources regarding liquefaction to enable the Planning Group's creation of a comprehensive liquefaction vulnerability assessment by deadline. However, liquefaction was still considered by the Planning Group as a potential effect of earthquakes with the possibility of causing impacts such as loss of life and property/assets. Therefore, liquefaction was still considered and researched within this vulnerability assessment section.

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
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 the tables below, to plan for an event that is more likely to occur in the near-term as discussed above).

The first table provides a breakdown of potential exposure and losses due to annualized earthquake events by jurisdiction. The second and third tables below provide a breakdown of infrastructure and critical facility losses from 100-year and 500-year earthquakes, respectively.

Approximately 81,590 people may be at risk from the annualized earthquake and earthquake-induced liquefaction hazards:

TABLE 40: POTENTIAL EXPOSURE AND LOSSES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk					Commercial buildings at Risk				
Jurisdiction	Exposed Population	Building Count	Potential Loss from Shaking (x$1,000)	Potential Additional Loss from Liquefaction (x$1,000)	Potential Additional Loss from Landslide (x$1,000)	Potential Exposure (x$1,000)	Building Count	Potential Loss from Shaking (x$1,000)	Potential Additional Loss from Liquefaction (x$1,000)	Potential Additional Loss from Landslide (x$1,000)	Potential Exposure (x$1,000)
Alpine Fire Protection District	0	32	26	0	10	26,569	20	12	0	4	10,824
Carlsbad	1,067	6,314	1,535	0	78	3,079,694	377	51	0	119	165,506
Chula Vista	3,170	3,342	1,688	18	115	2,005,905	342	66	2	130	163,269
Coronado	1,275	2,419	281	47	33	1,079,930	201	16	39	14	81,574
Del Mar	471	351	185	0	10	212,056	104	17	0	8	39,064
El Cajon	216	528	889	93	101	625,750	391	52	4	97	164,599
Encinitas	854	378	77	0	25	186,434	237	32	0	39	93,124
Escondido	57	696	142	0	193	400,637	436	53	0	153	194,230
Imperial Beach	1,458	198	28	57	38	124,830	148	13	7	32	60,410
La Mesa	211	243	49	0	48	132,056	163	29	0	20	64,189
Lemon Grove	284	224	29	0	20	105,992	98	8	0	13	35,859
National City	2,348	491	61	0	81	245,761	407	35	0	40	145,642
Oceanside	811	113	178	38	194	203,012	508	60	13	160	224,102
Otay Water District	1,443	259	183	0	56	193,636	94	54	0	94	73,199
Padre Dam Municipal Water District	183	268	129	53	91	210,007	318	74	2	161	167,714
Port Of San Diego	3,788	532	62	36	103	284,895	767	70	32	64	282,002
Poway	57	176	60	0	18	98,602	52	22	0	30	31,535
Rainbow Municipal Water District	39	421	86	27	32	219,737	156	22	1	80	78,248
Rancho Santa Fe FPD	612	616	147	0	49	315,563	313	57	0	93	139,928
San Diego	20,362	4,394	797	393	797	2,478,831	3,163	416	32	429	1,221,524
San Diego County Water Authority	32,161	15,665	3,214	1,685	2,677	9,029,249	9,631	1,345	92	2,632	4,142,044
San Marcos	254	743	153	0	130	398,683	474	58	0	204	222,469
San Miguel FPD	467	520	146	45	84	308,956	332	64	2	105	151,961
Santee	106	116	48	4	34	78,341	92	22	0	54	50,916
Solana Beach	353	136	19	0	9	63,607	109	12	0	8	38,852
Sweetwater Authority	4,987	984	193	18	196	540,326	719	84	2	156	290,468
Unincorporated	2,782	4,738	1,332	718	745	2,926,513	2,359	454	36	1,165	1,213,603
Vista	405	1,600	264	334	249	950,806	850	98	17	322	389,094
Vista Irrigation District	212	1,319	218	169	245	757,788	680	80	7	199	291,949
Total	**80,433**	**47,816**	**12,219**	**3,735**	**6,461**	**27,284,166**	**23,541**	**3,376**	**288**	**6,625**	**10,227,898**

TABLE 41: POTENTIAL EXPOSURE AND LOSSES TO CRITICAL FACILITIES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	1	1	0	0	0	3	1	**6**
	Exposure (x$1,000)	0	0	0	0	$87,500	$3,048	0	0	0	$62,722	$5,000	**158,270**
Chula Vista	Number	0	0	0	0	1	0	0	0	0	1	2	**4**
	Exposure (x$1,000)	0	0	0	0	$87,500	0	0	0	0	$33,904	$6,096	**127,500**
Coronado	Number	0	0	0	0	1	1	0	0	0	0	8	**10**
	Exposure (x$1,000)	0	0	0	0	$91,500	$10,048	0	0	0	0	$29,000	**130,548**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	0	0	0	2	1	0	0	0	2	0	**5**
	Exposure (x$1,000)	0	0	0	0	$175,000	$7,568	0	0	0	$10,048	0	**192,616**
Encinitas	Number	0	0	0	0	0	1	0	0	0	2	6	**9**
	Exposure (x$1,000)	0	0	0	0	0	$8,480	0	0	0	$36,504	$20,786	**65,770**
Escondido	Number	0	0	0	1	5	1	0	2	0	4	9	**22**
	Exposure (x$1,000)	0	0	0	$7,321	$437,500	$3,048	0	$40,297	0	65,445	$32,641	**586,252**
Imperial Beach	Number	0	0	0	0	0	1	0	0	0	0	7	**8**
	Exposure (x$1,000)	0	0	0	0	0	$13,924	0	0	0	0	$24,124	**38,048**
La Mesa	Number	0	0	0	0	0	0	0	0	0	0	7	**7**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$35,000	**35,000**
Lemon Grove	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$5,000	**5,000**
National City	Number	0	0	0	0	1	1	0	1	0	0	8	**11**
	Exposure (x$1,000)	0	0	0	0	$90,250	$4,523	0	$24,662	0	0	$27,743	**147,178**
Oceanside	Number	0	0	0	2	2	0	0	1	0	2	3	**10**
	Exposure (x$1,000)	0	0	0	$8,764	$6,346	0	0	$17,191	0	$32,722	$9,424	**74,447**
Otay Water Distrct	Number	0	0	0	0	3	0	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	0	0	0	$26,250	0	0	0	0	0	0	**26,250**
Padre Dam Municipal Water Distrct	Number	0	0	0	3	0	0	0	0	0	2	0	**5**
	Exposure (x$1,000)	0	0	0	$3,700	0	0	0	0	0	$5,572	0	**9,272**
Port of San Diego	Number	0	0	0	0	0	0	0	0	0	2	0	**2**
	Exposure (x1000)	0	0	0	0	0	0	0	0	0	$32,722	0	**32,722**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water Distrct	Number	0	0	0	1	1	0	0	0	0	0	4	**6**
	Exposure (x$1,000)	0	0	0	$5,517	$91,734	0	0	0	0	0	$12,249	**109,500**
Rancho Santa Fe FPD	Number	0	0	0	0	1	0	0	0	0	0	2	**3**
	Exposure (x$1,000)	0	0	0	0	$87,734	0	0	0	0	0	$9,766	**97,500**
San Diego (City)	Number	0	0	0	8	8	1	0	1	0	3	8	**29**
	Exposure (x$1,000)	0	0	0	$35,589	$193,456	$26,116	0	$31,132	0	$199,084	$24,384	**509,761**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego County Water Authority	Number	0	0	0	8	6	7	0	8	0	12	19	**60**
	Exposure (x1000)	0	0	0	$37,420	$525,000	$26,676	0	$133,034	0	$293,199	$59,572	**1,074,901**
San Marcos	Number	0	0	0	1	0	3	0	1	0	0	3	**8**
	Exposure (x$1,000)	0	0	0	$4,000	0	$10,430	0	$16,629	0	0	$11,714	**42,773**
San Miguel FPD	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	2	1	0	1	0	1	2	**7**
	Exposure (x$1,000)	0	0	0	0	$176,444	$3,048	0	$16,629	0	$32,460	$6,096	**234,677**
Unincorporated	Number	0	0	0	4	2	3	0	1	0	5	7	**22**
	Exposure (x$1,000)	0	0	0	$20,022	$205,054	$14,234	0	$21,639	0	$81,806	$21,336	**364,091**
Vista	Number	0	0	0	0	0	2	0	1	0	0	3	**6**
	Exposure (x$1,000)	0	0	0	0	0	$9,952	0	$16,629	0	0	$11,144	**37,725**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	$5,000	**5,000**
Total Number		**0**	**0**	**0**	**28**	**36**	**24**	**0**	**17**	**0**	**39**	**101**	**245**
Total Exposure (x $1,000)		**0**	**0**	**0**	**122,333**	**2,281,268**	**141,095**	**0**	**317,842**	**0**	**886,188**	**356,075**	**4,104,801**

TABLE 42: POTENTIAL INFRASTRUCTURE EXPOSURE AND LOSSES FROM ANNUALIZED EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	6,121	0	0	**6,121**
Carlsbad	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	17,303	0	0	**17,303**
Chula Vista	Number	3	0	0	**3**
	Exposure (x$1,000)	21,124	0	0	**21,124**
Coronado	Number	11	0	0	**11**
	Exposure (x$1,000)	74,336	0	0	**74,336**
Del Mar	Number	1	0	0	**1**
	Exposure (x$1,000)	3,701	0	0	**3,701**
El Cajon	Number	2	0	0	**2**
	Exposure (x$1,000)	15,503	0	0	**15,503**
Encinitas	Number	1	0	0	**1**
	Exposure (x$1,000)	6,081	0	0	**6,081**
Escondido	Number	4	0	0	**4**
	Exposure (x$1,000)	25,252	0	0	**25,252**
Imperial Beach	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Number	5	0	0	**5**
	Exposure (x$1,000)	34,013	0	0	**34,013**
Lemon Grove	Number	3	0	0	**3**
	Exposure (x$1,000)	19,771	0	0	**19,771**
National City	Number	7	0	0	**7**
	Exposure (x$1,000)	43,409	0	0	**43,409**
Oceanside	Number	5	0	0	**5**
	Exposure (x$1,000)	33,950	0	0	**33,950**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Otay Water District	Number	6	0	0	**6**
	Exposure (x$1,000)	36,954	0	0	**36,954**
Padre Dam Municipal Water Distrct	Number	7	0	0	**7**
	Exposure (x1000)	44,309	0	0	**44,309**
Port of San Diego	Number	4	0	0	**4**
	Exposure (x1000)	29,618	0	0	**29,618**
Poway	Number	0	0	0	**0**
	Exposure (x$1,000)	2,447	0	0	**2,447**
Rainbow Municipal Water District	Number	12	0	0	**12**
	Exposure (x1000)	77,724	0	0	**77,724**
Rancho Santa Fe FPD	Number	1	0	0	**1**
	Exposure (x1000)	3,194	0	0	**3,194**
San Diego (City)	Number	73	0	0	**73**
	Exposure (x$1,000)	487,978	0	0	**487,978**
San Diego County Water Authority	Number	155	0	0	**155**
	Exposure (x1000)	1,031,356	0	0	**1,031,356**
San Marcos	Number	1	0	0	**1**
	Exposure (x$1,000)	6,875	0	0	**6,875**
San Miguel FPD	Number	3	0	0	**3**
	Exposure (x$1,000)	22,018	0	0	**22,018**
Santee	Number	5	0	0	**5**
	Exposure (x$1,000)	34,354	0	0	**34,354**
Solana Beach	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Number	10	0	0	**10**
	Exposure (x$1,000)	64,360	0	0	**64,360**
Unincorporated	Number	113	0	5	**118**
	Exposure (x$1,000)	756,449	0	7,954	**764,403**
Vista	Number	1	0	0	**1**
	Exposure (x$1,000)	5,401	0	0	**5,401**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista Irrigation District	Number	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**437**	**0**	**5**	**449**
Total Exposure (x $1,000)		**2,903,601**	**0**	**7,954**	**2,960,937**

TABLE 43: POTENTIAL EXPOSURE AND LOSSES FROM 100-YEAR EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	0	0	0	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	0	0
Del mar	0	0	0	0	0
El Cajon	0	0	0	0	0
Encinitas	0	0	0	0	0
Escondido	0	0	0	0	0
Imperial beach	0	0	0	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	0	0	0	0	0
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	0	0	0	0	0
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego	0	0	0	0	0
San Diego County Water Authority	0	0	0	0	0
San Marco	0	0	0	0	0
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	0	0	0	0	0
Unincorporated	4,440	2,982	$1,158,507	77	$23,281
Vista	0	0	0	0	0
Vista Irrigation District	0	0	0	0	0
Total	**4,440**	**2,982**	**$1,158,507**	**77**	**$23,281**

TABLE 44: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 100-YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fed Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego County Water Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	3	11	0	4	6	3	4	0	0	0	3	**34**
	Exposure (x$1,000)	$176,376	$62,920	0	$8,000	$1,938,000	$9,144	$12,192	0	0	0	$27,602	**$2,234,234**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total Exposure (x $1,000)		**$176,376**	**$62,920**	**0**	**$8,000**	**$1,938,000**	**$9,144**	**$12,192**	**0**	**0**	**0**	**$27,602**	**$2,234,234**

TABLE 45: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 100- YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
	Total KMs	0	0	0	**0**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water District	Exposure (x$1,000)	0	0	0	**0**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rancho Santa Fe Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego (City)	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Diego County Water Authority	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
San Marcos	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
San Miguel Fire Protection District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Unincorporated	Total KMs	183	0	29	**212**
	Exposure (x$1,000)	$43,215	0	$1,219,888	**$1,263,013**
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**183**	**0**	**29**	**212**
Total Exposure (x $1,000)		**$43,215**	**0**	**$1,219,888**	**$1,263,013**

TABLE 46: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 500-YEAR EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	0	0	0	0	0
Carlsbad	19,092	4,538	$1,763,467	352	$106,427
Chula Vista	0	0	0	0	0
Coronado	0	0	0	0	0
Del mar	0	0	0	0	0
El Cajon	0	0	0	0	0
Encinitas	0	0	0	0	0
Escondido	96,129	21,857	$8,493,630	974	$294,489
Imperial beach	0	0	0	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	130,943	40,592	$15,774,051	1,492	$451,106
Otay Water District	0	0	0	0	0
Padre Dam Municipal Water District	0	0	0	0	0
Port of San Diego	0	0	0	0	0
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	8,313	$3,230,432	54	$16,327
Rancho Santa Fe Fire Protection District	0	0	0	0	0
San Diego	504	0	0	2	$604,700
San Diego County Water Authority	501,096	138,019	$53,634,183	8,341	$2,521,901
San Marcos	55,473	13,312	$5,173,043	1,148	$347,098
San Miguel Fire Protection District	0	0	0	0	0
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	0	0	0	0	0
Unincorporated	193,801	46,242	$17,969,641	3,272	$989,289
Vista	90,570	21,763	$8,457,102	1,041	$423,592
Vista Irrigation District	33,787	1,262	$490,413	61	$18,443
Total	**1,121,395**	**295,898**	**$114,985,962**	**16,737**	**$5,773,372**

TABLE 47: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 500-YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	1	0	0	0	0	1	0	0	0	2	**4**
0	Exposure (x$1,000)	0	5,720	0	0	0	0	3,048	0	0	0	134,384	**143,152**
Chula Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	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	Exposure (x$1,000)	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	Exposure (x$1,000)	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	Exposure (x$1,000)	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	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	22	0	0	3	2	11	1	0	1	17	**57**
0	Exposure (x$1,000)	0	146,740	0	0	969,000	6,096	33,528	16,629	0	30,000	996,780	**2,198,773**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
0	Exposure (x$1,000)	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	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	1	27	1	1	1	8	9	1	0	2	17	**68**
	Exposure (x$1,000)	86,701	175,340	1,830	2,000	47,000	30,480	27,432	16,629	0	327,223	775,594	**1,490,229**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	41	0	1	2	3	2	0	0	1	4	**54**
	Exposure (x$1,000)	0	273,470	0	2,000	1,797,000	9,144	6,096	0	0	0	0	**2,087,710**
San Diego (City)	Number	0	2	0	0	0	0	1	0	0	0	1	**4**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	0	41,736	**58,124**
San Diego County Water Authority	Number	2	159	3	2	20	45	47	3	0	11	83	**375**
	Exposure (x$1,000)	167,681	1,051,980	5,490	4,000	7,564,000	137,160	143,256	49,888	0	1,131,670	4,277,866	**14,532,991**
San Marcos	Number	0	16	1	0	1	5	6	0	0	0	11	**40**
	Exposure (x$1,000)	0	104,820	1,830	0	47,000	15,240	18,288	0	0	0	593,776	**780,954**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Unincorporated	Number	3	211	0	7	35	43	42	1	0	13	40	**395**
	Exposure (x$1,000)	271,772	1,383,620	0	14,000	11,581,000	131,064	128,016	16,629	0	924,447	1,280,792	**15,731,340**
Vista	Number	0	8	1	0	1	8	3	0	0	0	15	**36**
	Exposure (x$1,000)	0	52,410	1,830	0	47,000	24,384	9,144	0	0	0	692,122	**826,890**
Vista Irrigation District	Number	0	1	0	0	0	0	0	0	0	0	1	**2**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	41,070	**47,740**
Total Number		**6**	**488**	**6**	**11**	**63**	**114**	**122**	**6**	**0**	**28**	**191**	**1,035**
Total Exposure (x $1,000)		**526,154**	**3,214,110**	**10,980**	**22,000**	**22,052,000**	**353,568**	**371,856**	**99,775**	**0**	**2,413,340**	**8,834,120**	**37,897,903**

TABLE 48: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 500- YEAR EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	42	3	2	**47**
	Exposure (x$1,000)	277,290	1,768	2,702	**281,760**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	113	15	0	**128**
	Exposure (x$1,000)	751,643	9,996	0	**761,639**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	197	21	21	**239**
	Exposure (x$1,000)	1,315,268	14,640	32,248	**1,362,156**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Rainbow Municipal Water District	Total KMs	308	25	0	**333**
	Exposure (x$1,000)	2,053,961	16,929	0	**2,070,890**
San Diego (City)	Total KMs	8	0	0	**8**
	Exposure (x$1,000)	53,990	0	0	**53,990**
San Diego County Water Authority	Total KMs	1,251	129	44	**1,424**
	Exposure (x1000)	8,342,432	88,164	65,329	**8,495,925**
San Marcos	Total KMs	140	11	13	**164**
	Exposure (x$1,000)	933,731	16,937	8,600	**959,268**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Unincorporated	Total KMs	1,846	69	93	**2,008**
	Exposure (x$1,000)	12,306,924	46,921	139,012	**12,492,857**
Vista	Total KMs	116	12	8	**136**
	Exposure (x$1,000)	772,613	8,252	12,359	**793,224**
Vista Irrigation District	Total KMs	7	1	1	**9**
	Exposure (x$1,000)	47,718	835	980	**49,533**
Total Number		**4,028**	**286**	**182**	**4,496**
Total Exposure (x $1,000)		**26,855,570**	**204,442**	**265,723**	**27,321,242**

TABLE 49: POTENTIAL EXPOSURE AND LOSSES FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fpd	0	0	0	0	0
Carlsbad	114,187	36,605	14,221,043	3,474	1,050,364
Chula Vista	210,011	46,508	18,068,358	4,483	1,355,435
Coronado	19,375	7,211	2,801,474	857	259,114
Del Mar	3,965	2,001	777,389	546	165,083
El Cajon	0	0	0	0	0
Encinitas	59,322	19,547	7,594,010	3,192	965,101
Escondido	0	0	0	0	0
Imperial Beach	27,161	5,698	2,213,673	421	127,289
La Mesa	25,203	5,473	2,126,261	604	182,619
Lemon Grove	26,480	6,522	2,533,797	594	179,596
National City	61,014	8,648	3,359,748	1,413	427,221
Oceanside	104,063	28,369	11,021,357	2,281	689,660
Otay Water District	126,387	28,869	11,215,607	1,267	383,077
Padre Dam Municipal Water District	0	0	0	0	0
Port Of San Diego	14,710	0	0	485	146,640
Poway	0	0	0	0	0
Rainbow Municipal Water District	0	0	0	0	0
Rancho Santa Fe Fpd	19,844	4,259	1,654,622	329	99,473
San Diego	1,184,880	280,311	108,900,824	36,762	11,114,991
San Diego County Water Authority	1,926,720	454,167	176,443,880	55,724	16,848,151
San Marcos	378	117	45,455	5	1,512
San Miguel Fpd	29,048	5,303	2,060,216	416	125,778
Santee	0	0	0	0	0
Solana Beach	13,214	5,113	1,986,401	1,229	371,588
Sweetwater Authority	113,119	33,847	13,149,560	5,152	1,557,707
Unincorporated	94,666	13,228	5,139,078	945	285,721
Vista	8,730	1,804	700,854	202	61,075
Vista Irrigation District	0	0	0	0	0
Total	**4,182,477**	**993,600**	**386,013,599**	**120,381**	**36,397,195**

TABLE 50: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	POT	SCH	TOTAL
Alpine FPD	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	1	44	0	0	7	10	11	0	5	20	**98**
	Exposure (x$1,000)	182,097	289,680	0	0	1,985,000	30,480	33,528	0	684,447	1,139,748	**4,344,980**
Chula Vista	Number	0	54	4	0	8	12	16	2	1	56	**153**
	Exposure (x$1,000)	0	356,380	7,320	0	2,032,000	36,576	48,768	33,259	30,000	6,077,768	**8,622,071**
Coronado	Number	0	1	0	1	3	3	5	1	0	4	**18**
	Exposure (x$1,000)	0	6,670	0	4,000	141,000	9,144	15,240	16,629	0	225,996	**418,679**
Del Mar	Number	0	6	0	0	0	3	4	0	0	0	**13**
	Exposure (x$1,000)	0	39,070	0	0	0	9,144	12,192	0	0	0	**60,406**
El Cajon	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Encinitas	Number	0	15	0	0	1	6	9	1	1	12	**45**
	Exposure (x$1,000)	0	98,150	0	0	47,000	18,288	27,432	16,629	163,612	579,494	**950,605**
Escondido	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Imperial Beach	Number	0	0	0	0	0	2	5	0	0	5	**12**
	Exposure (x$1,000)	0	0	0	0	0	6,096	15,240	0	0	289,784	**311,120**
La Mesa	Number	0	5	1	0	0	0	0	0	0	3	**9**
	Exposure (x$1,000)	0	32,400	1,830	0	0	0	0	0	0	117,438	**151,668**
Lemon Grove	Number	0	12	0	0	1	3	5	0	0	5	**26**
	Exposure (x$1,000)	0	79,090	0	0	47,000	9,144	15,240	0	0	208,236	**358,710**
National City	Number	0	65	0	0	6	5	7	1	0	15	**99**
	Exposure (x$1,000)	0	426,900	0	0	282,000	15,240	21,336	16,629	0	919,450	**1,681,555**
Oceanside	Number	1	37	0	1	3	12	18	1	1	20	**94**
	Exposure (x$1,000)	86,701	243,940	0	4,000	969,000	36,576	54,864	16,629	163,612	3,317,050	**4,892,372**
Otay Water District	Number	0	38	1	0	4	7	4	1	0	31	**86**
	Exposure (x$1,000)	0	253,460	1,830	0	1,844,000	21,336	12,192	16,629	0	4,623,446	**6,772,893**
Padre Dam Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Port of San Diego	Number	3	3	0	0	3	7	4	0	0	0	**20**
	Exposure (x$1,000)	300,604	19,060	0	0	969,000	21,336	12,192	0	0	0	**1,322,192**
Poway	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	15	0	0	1	2	4	0	4	3	**29**
	Exposure (x$1,000)	0	100,050	0	0	47,000	6,096	12,192	0	520,835	64,010	**750,183**
San Diego (City)	Number	3	550	11	32	65	94	138	9	5	263	**1,170**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	POT	SCH	TOTAL
	Exposure (x$1,000)	745,778	3,637,150	20,130	128,000	13,819,000	286,512	420,624	149,663	684,447	28,292,272	**48,183,576**
San Diego County Water Authority	Number	4	859	16	33	96	154	220	14	17	410	**1,823**
	Exposure (x$1,000)	1,014,575	5,676,330	29,280	132,000	21,072,000	469,392	670,560	232,809	2,246,952	41,331,960	**72,875,858**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	36	0	0	0	2	1	0	1	6	**46**
	Exposure (x$1,000)	0	240,120	0	0	0	6,096	3,048	0	30,000	284,752	**564,016**
Santee	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Solana Beach	Number	0	4	0	0	0	1	4	0	0	4	**13**
	Exposure (x$1,000)	0	26,680	0	0	0	3,048	12,192	0	0	113,146	**155,066**
Sweetwater Authority	Number	0	119	3	0	13	14	23	2	2	48	**224**
	Exposure (x$1,000)	0	783,280	5,490	0	2,267,000	42,672	70,104	33,259	60,000	2,654,158	**5,915,963**
Unincorporated	Number	0	79	0	0	4	7	8	0	5	11	**114**
	Exposure (x$1,000)	0	526,930	0	0	1,844,000	21,336	24,384	0	550,835	414,252	**3,381,737**
Vista	Number	0	1	0	0	1	1	0	0	0	1	**4**
	Exposure (x$1,000)	0	6,670	0	0	47,000	3,048	0	0	0	163,106	**219,824**
Vista Irrigation District	Number	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**9**	**1,923**	**35**	**67**	**212**	**335**	**477**	**32**	**42**	**909**	**4,041**
Total Exposure (x $1,000)		**2,029,150**	**12,711,460**	**64,050**	**268,000**	**46,396,000**	**1,021,080**	**1,453,896**	**532,135**	**5,134,740**	**90,490,392**	**160,100,903**

TABLE 51: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM ROSE CANYON SCENARIO EARTHQUAKE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Carlsbad	Total KMs	175	86	19	**280**
	Exposure (x$1,000)	1,166,948	58,397	29,139	**1,254,484**
Chula Vista	Total KMs	313	43	16	**372**
	Exposure (x$1,000)	2,088,358	29,225	23,583	**2,141,166**
Coronado	Total KMs	17	16	0	**33**
	Exposure (x$1,000)	115,663	10,875	0	**126,538**
Del Mar	Total KMs	3	8	6	**17**
	Exposure (x$1,000)	20,658	5,734	8,561	**34,953**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	84	43	12	**139**
	Exposure (x$1,000)	560,387	29,238	18,293	**607,918**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	3	4	0	**7**
	Exposure (x$1,000)	16,720	2,743	0	**19,463**
La Mesa	Total KMs	57	3	4	**64**
	Exposure (x$1,000)	379,149	1,806	6,699	**387,654**
Lemon Grove	Total KMs	41	6	9	**56**
	Exposure (x$1,000)	270,926	3,781	12,751	**287,458**
National City	Total KMs	105	12	28	**145**
	Exposure (x$1,000)	703,183	8,240	42,451	**753,874**
Oceanside	Total KMs	183	39	22	**244**
	Exposure (x$1,000)	1,221,266	26,798	32,077	**1,280,141**
	Total KMs	139	22	0	**161**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Otay Water District	Exposure (x1000)	930,061	15,258	0	**945,319**
Padre Dam Municipal Water District	Total KMs	0	0	0	**45**
	Exposure (x1000)	0	0	0	**139,152**
Port of San Diego	Total KMs	15	9	21	**45**
	Exposure (x1000)	101,430	6,267	31,455	**139,152**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Rancho Santa Fe FPD	Total KMs	3	5	0	**8**
	Exposure (x$1,000)	19,405	3,355	0	**22,760**
San Diego (City)	Total KMs	1,145	303	213	**1,661**
	Exposure (x$1,000)	7,633,100	207,096	319,623	**8,159,819**
San Diego County Water Authority	Total KMs	1,233	580	257	**2,070**
	Exposure (x1000)	8,222,970	396,449	386,060	**9,005,479**
San Marcos	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	17,139	0	0	**17,139**
San Miguel FPD	Total KMs	49	9	0	**58**
	Exposure (x$1,000)	327,067	6,148	0	**333,215**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	22	14	5	**41**
	Exposure (x$1,000)	149,284	9,776	6,752	**165,812**
Sweetwater Authority	Total KMs	80	5	38	**123**
	Exposure (x$1,000)	531,071	3,375	57,035	**591,481**
Unincorporated	Total KMs	153	22	1	**176**
	Exposure (x$1,000)	1,019,835	15,237	130	**1,035,202**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista	Total KMs	22	1	0	**23**
	Exposure (x$1,000)	143,694	908	0	**144,602**
Vista Irrigation District	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Total Number		**3,845**	**1,230**	**651**	**5,726**
Total Exposure (x $1,000)		**25,638,314**	**840,706**	**974,609**	**27,453,629**

5.3.8. 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 used 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).

The first table below provides a breakdown of potential exposure and losses by jurisdiction for 100-year flood, and the second table provides a breakdown of infrastructure and critical facility losses for 100-year flood by jurisdiction. The third table provides a breakdown of potential exposure and losses by jurisdiction from 500-year flood, and the fourth table 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 270,263 people may be at risk from the 100-year flood hazard.

Approximately 585,882 people are at risk from the 500-year flood hazard.

TABLE 52: POTENTIAL EXPOSURE AND LOSSES FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fire Protection District	268	23	$8,938	1	$302
Carlsbad	2,497	619	$240,543	15	$4,535
Chula Vista	1,741	633	$245,984	169	$51,097
Coronado	4,022	0	$0	2	$605
Del Mar	1,123	384	$149,222	29	$8,768
El Cajon	5,427	80	$31,088	30	$9,071
Encinitas	661	32	$12,435	6	$1,814
Escondido	7,380	1,625	$631,475	209	$63,191
Imperial Beach	2,702	55	$21,373	1	$302
La Mesa	73	1	$389	3	$907
Lemon Grove	0	3	$1,166	4	$1,209
National City	10,693	149	$57,901	139	$42,027
Oceanside	13,323	4,540	$1,764,244	448	$135,453
Otay Water District	2,623	51	$19,819	16	$4,838
Padre Dam Municipal Water District	5,330	613	$238,212	75	$22,676
Port of San Diego	17,614	0	$0	2	$605
Poway	656	343	$133,290	64	$19,350
Rainbow Municipal Water District	1,124	105	$40,803	25	$7,559
Rancho Santa Fe Fire Protection District	1,252	23	$8,938	7	$2,116
San Diego (City)	35,523	4,976	$1,933,674	733	$221,623
San Diego County Water Authority	101,369	16,590	$6,446,874	2,397	$724,733
San Marcos	4,150	279	$108,419	106	$32,049
San Miguel Fire Protection District	3,575	524	$203,626	59	$17,839
Santee	1,279	40	$15,544	13	$3,931
Solana Beach	656	313	$121,632	11	$3,326
Sweetwater Authority	13,338	1,195	$464,377	486	$146,942
Unincorporated:	17,979	4,151	$1,613,079	530	$160,246
Vista	889	455	$176,813	38	$11,489
Vista Irrigation District	481	35	$13,601	7	$2,116
Total	**257,748**	**37,837**	**14,703,459**	**5,625**	**1,700,719**

TABLE 53: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine Fire Protection District	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Carlsbad	Number	0	19	0	0	0	0	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	123,880	0	0	0	0	0	0	0	0	0	**123,880**
Chula Vista	Number	0	14	0	0	2	1	1	0	0	0	0	**16**
	Exposure (x$1,000)	0	91,480	0	0	922,000	3,048	3,048	0	0	0	0	**1,019,576**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	3	0	0	0	0	0	0	0	0	2	**5**
	Exposure (x$1,000)	0	20,010	0	0	0	0	0	0	0	0	230,806	**250,816**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	8	0	0	0	1	2	0	0	0	3	**14**
	Exposure (x$1,000)	0	53,360	0	0	0	3,048	6,096	0	0	0	200,836	**263,340**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	64,800	0	0	0	0	0	0	0	0	0	**64,800**
Oceanside	Number	1	21	0	0	0	3	4	0	0	0	2	**31**
	Exposure (x$1,000)	86,701	134,370	0	0	0	9,144	12,192	0	0	0	88,356	**330,763**
Otay Water District	Number	0	15	0	0	0	0	0	0	0	0	0	**15**
	Exposure (x$1,000)	0	100,050	0	0	0	0	0	0	0	0	0	**100,050**
Padre Dam Municipal Water District	Number	31	0	0	0	0	0	0	0	0	0	0	**31**
	Exposure (x$1,000)	206,770	0	0	0	0	0	0	0	0	0	0	**206,770**
Port of San Diego	Number	1	0	0	0	0	0	0	0	1	0	0	**2**
	Exposure (x$1,000)	6,670	0	0	0	0	0	0	0	719,793	0	0	**726,463**
Poway	Number	0	12	0	0	0	1	0	0	0	0	0	**13**
	Exposure (x$1,000)	0	80,040	0	0	0	3,048	0	0	0	0	0	**83,088**
Rainbow Municipal Water District	Number	0	17	0	0	0	1	0	0	0	0	1	**19**
	Exposure (x$1,000)	0	113,390	0	0	0	3,048	0	0	0	0	14,430	**130,868**
Rancho Santa Fe FPD	Number	0	8	0	0	0	0	0	0	0	1	0	**9**
	Exposure (x$1,000)	0	53,360	0	0	0	0	0	0	0	163,612	0	**216,972**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego (City)	Number	0	138	0	3	2	2	2	0	1	0	1	**149**
	Exposure (x$1,000)	0	903,360	0	6,000	94,000	6,096	6,096	0	719,793	0	43,068	**1,778,413**
San Diego County Water Authority	Number	1	360	0	6	4	11	11	0	1	1	11	**406**
	Exposure (x$1,000)	86,701	2,364,150	0	12,000	1,016,000	33,528	33,528	0	719,793	163,612	364,476	**4,793,788**
San Marcos	Number	0	10	0	0	0	0	0	0	0	0	0	**10**
	Exposure (x$1,000)	0	63,850	0	0	0	0	0	0	0	0	0	**63,850**
San Miguel FPD	Number	0	25	0	0	0	0	0	0	0	0	0	**25**
	Exposure (x$1,000)	0	166,750	0	0	0	0	0	0	0	0	0	**166,750**
Santee	Number	0	12	0	0	0	0	0	0	0	0	0	**12**
	Exposure (x$1,000)	0	80,040	0	0	0	0	0	0	0	0	0	**80,040**
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Sweetwater Authority	Number	0	24	0	0	2	1	2	0	0	0	1	**30**
	Exposure (x$1,000)	0	156,280	0	0	922,000	3,048	6,096	0	0	0	22,126	**1,109,550**
Unincorporated	Number	1	124	0	7	4	4	4	0	0	2	6	**152**
	Exposure (x$1,000)	80,980	824,230	0	14,000	1,844,000	12,192	12,192	0	0	193,612	99,012	**3,080,218**
Vista	Number	0	3	0	0	0	0	1	0	0	0	0	**4**
	Exposure (x$1,000)	0	19,060	0	0	0	0	3,048	0	0	0	0	**22,108**
Vista Irrigation District	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	5,720	0	0	0	0	0	0	0	0	0	**5,720**
Total Number		**35**	**834**	**0**	**16**	**14**	**27**	**27**	**0**	**3**	**4**	**27**	**985**
Total Exposure (x $1,000)		**467,822**	**5,482,980**	**0**	**32,000**	**4,798,000**	**82,296**	**82,296**	**0**	**2,159,379**	**520,836**	**1,063,110**	**14,688,719**

TABLE 54: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 100-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	13	7	1	**21**
	Exposure (x$1,000)	83,715	4,631	342	**88,688**
Chula Vista	Total KMs	32	3	1	**36**
	Exposure (x$1,000)	210,783	2,373	194	**213,350**
Coronado	Total KMs	2	3	0	**5**
	Exposure (x$1,000)	11,014	1,984	0	**12,998**
Del Mar	Total KMs	6	3	2	**11**
	Exposure (x$1,000)	37,125	1,804	2,515	**41,444**
El Cajon	Total KMs	3	1	1	**5**
	Exposure (x$1,000)	17,924	84	98	**18,106**
Encinitas	Total KMs	5	4	1	**10**
	Exposure (x$1,000)	32,741	2,541	119	**35,401**
Escondido	Total KMs	26	2	0	**28**
	Exposure (x$1,000)	172,723	1,651	0	**174,374**
Imperial Beach	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	543	0	**543**
La Mesa	Total KMs	1	1	1	**3**
	Exposure (x$1,000)	3,158	225	180	**3,563**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	14	1	1	**16**
	Exposure (x$1,000)	95,654	233	384	**96,271**
Oceanside	Total KMs	54	10	10	**74**
	Exposure (x$1,000)	362,336	6,755	14,077	**383,168**
Otay Water District	Total KMs	26	3	0	**29**
	Exposure (x1000)	170,295	2,057	0	**172,352**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water District	Total KMs	7	2	1	**10**
	Exposure (x1000)	48,638	1,591	98	**50,327**
Port of San Diego	Total KMs	5	2	6	**13**
	Exposure (x1000)	31,645	1,210	8,353	**41,208**
Poway	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	11,352	114	0	**11,466**
Rainbow Municipal Water District	Total KMs	22	1	0	**23**
	Exposure (x$1,000)	147,114	844	0	**147,958**
San Diego (City)	Total KMs	141	22	38	**201**
	Exposure (x$1,000)	1,141,289	15,261	57,503	**1,214,053**
San Diego County Water Authority	Total KMs	426	63	53	**542**
	Exposure (x1000)	2,842,718	43,267	79,247	**2,965,232**
San Marcos	Total KMs	19	2	2	**23**
	Exposure (x$1,000)	128,671	1,238	2,565	**132,474**
San Miguel FPD	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	14,886	704	0	**15,590**
Santee	Total KMs	5	2	0	**7**
	Exposure (x$1,000)	35,785	1,394	0	**37,179**
Solana Beach	Total KMs				**0**
	Exposure (x$1,000)				**0**
Sweetwater Authority	Total KMs	47	3	1	**51**
	Exposure (x$1,000)	310,550	2,059	577	**313,186**
Unincorporated	Total KMs	104	8	1	**113**
	Exposure (x$1,000)	694,666	5,505	1,032	**701,203**
Vista	Total KMs	9	1	1	**11**
	Exposure (x$1,000)	57,799	369	928	**59,096**
Vista Irrigation District	Total KMs	2	0	1	**3**
	Exposure (x$1,000)	13,618	0	37	**13,655**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Total Number		**973**	**147**	**122**	**1,242**
Total Exposure (x $1,000)		**6,676,199**	**98,437**	**168,249**	**6,942,885**

TABLE 55: POTENTIAL EXPOSURE AND LOSSES FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fpd	268	23	8,938	1	302
Carlsbad	2,497	619	240,543	15	4,535
Chula Vista	14,651	3,628	1,409,841	556	168,107
Coronado	4,022	0	0	2	605
Del Mar	1,228	475	184,585	36	10,885
El Cajon	20,560	6,231	2,421,367	867	262,137
Encinitas	681	44	17,098	10	3,024
Escondido	31,005	10,048	3,904,653	545	164,781
Imperial Beach	2,702	55	21,373	3	907
La Mesa	105	1	389	3	907
Lemon Grove	0	3	1,166	4	1,209
National City	12,868	909	353,237	200	60,470
Oceanside	33,750	12,611	4,900,635	659	199,249
Otay Water District	4,976	632	245,595	116	35,073
Padre Dam Municipal Water District	7,573	1,447	562,304	298	90,100
Port Of San Diego	17,736	0	0	18	5,442
Poway	3,107	1,090	423,574	134	40,515
Rainbow Municipal Water District	3,137	773	300,388	45	13,606
Rancho Santa Fe Fpd	1,262	36	13,990	7	2,116
San Diego	68,368	14,269	5,544,933	1,706	515,809
San Diego County Water Authority	221,421	56,606	21,997,092	5,880	1,777,818
San Marcos	4,230	503	195,466	178	53,818
San Miguel Fpd	5,417	700	272,020	86	26,002
Santee	2,846	751	291,839	217	65,610
Solana Beach	1,022	509	197,797	57	17,234
Sweetwater Authority	30,746	4,378	1,701,291	857	259,114
Unincorporated	26,802	5,967	2,318,776	618	186,852
Vista	3,135	1,096	425,906	230	69,541
Vista Irrigation District	818	48	18,653	14	4,233
Total	**526,933**	**123,452**	**47,973,449**	**13,362**	**4,040,001**

TABLE 56: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	19	0	0	0	0	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	123,880	0	0	0	0	0	0	0	0	0	**123,880**
Chula Vista	Number	0	19	1	0	4	2	1	0	0	0	1	**28**
	Exposure (x$1,000)	0	124,830	1,830	0	1,844,000	6,096	3,048	0	0	0	119,880	**2,099,684**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	3	0	0	0	2	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	19,060	0	0	0	6,096	0	0	0	0	0	**25,156**
El Cajon	Number	0	25	1	0	0	2	2	0	0	0	5	**35**
	Exposure (x$1,000)	0	166,750	1,830	0	0	6,096	6,096	0	0	0	368,594	**549,366**
Encinitas	Number	0	5	0	0	0	0	0	0	0	0	0	**5**
	Exposure (x$1,000)	0	32,400	0	0	0	0	0	0	0	0	0	**32,400**
Escondido	Number	0	34	0	0	3	3	9	0	0	1	8	**58**
	Exposure (x$1,000)	0	224,880	0	0	969,000	9,144	27,432	0	0	163,612	420,246	**1,814,314**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
National City	Number	0	12	0	0	0	0	2	0	0	0	0	**14**
	Exposure (x$1,000)	0	78,140	0	0	0	0	6,096	0	0	0	0	**84,236**
Oceanside	Number	1	23	0	1	0	6	6	0	0	0	5	**42**
	Exposure (x$1,000)	20,137	147,710	0	2,000	0	18,288	18,288	0	0	0	199,578	**406,001**
Otay Water District	Number	0	16	0	0	0	0	0	0	0	1	0	**17**
	Exposure (x$1,000)	0	106,720	0	0	0	0	0	0	0	163,612	0	**270,332**
Padre Dam Municipal Water District	Number	0	43	0	0	0	1	1	0	0	0	0	**45**
	Exposure (x$1,000)	0	286,810	0	0	0	3,048	3,048	0	0	0	0	**292,906**
Port of San Diego	Number	0	1	0	0	2	1	0	0	1	0	0	**5**
	Exposure (x$1,000)	0	6,670	0	0	922,000	3,048	0	0	719,793	0	0	**1,651,511**
Poway	Number	0	18	0	0	0	1	0	0	0	0	0	**19**
	Exposure (x$1,000)	0	120,060	0	0	0	3,048	0	0	0	0	0	**123,108**
Rainbow Municipal Water District	Number	0	19	0	0	0	1	0	0	0	0	1	**21**
	Exposure (x$1,000)	0	126,730	0	0	0	3,048	0	0	0	0	14,430	**144,208**
Rancho Santa Fe FPD	Number	0	8	0	0	0	0	0	0	0	1	0	**9**
	Exposure (x$1,000)	0	53,360	0	0	0	0	0	0	0	163,612	0	**216,972**
San Diego (City)	Number	0	184	1	3	4	4	8	0	1	1	3	**209**
	Exposure (x$1,000)	0	1,208,280	5,490	6,000	1,016,000	12,192	24,384	0	719,793	163,612	138,602	**3,294,353**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego County Water Authority	Number	1	486	6	7	11	24	34	0	1	4	29	**603**
	Exposure (x$1,000)	20,137	3,200,770	10,980	14,000	3,829,000	73,152	103,632	0	719,793	654,447	1,395,270	**10,021,181**
San Marcos	Number	0	13	1	0	0	0	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	83,860	1,830	0	0	0	3,048	0	0	0	13,912	**102,650**
San Miguel FPD	Number	0	25	0	0	0	0	0	0	0	1	0	**26**
	Exposure (x$1,000)	0	166,750	0	0	0	0	0	0	0	163,612	0	**330,362**
Santee	Number	0	17	0	0	0	0	1	0	0	0	0	**18**
	Exposure (x$1,000)	0	113,390	0	0	0	0	3,048	0	0	0	0	**116,438**
Solana Beach	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Sweetwater Authority	Number	0	30	1	0	4	2	4	0	0	0	2	**43**
	Exposure (x$1,000)	0	196,300	1,830	0	1,844,000	6,096	12,192	0	0	0	142,006	**2,202,424**
Unincorporated	Number	1	133	0	7	4	4	5	0	0	3	7	**164**
	Exposure (x$1,000)	14,416	884,260	0	14,000	1,844,000	12,192	15,240	0	0	357,223	114,626	**3,255,957**
Vista	Number	0	5	0	0	0	3	3	0	0	0	2	**13**
	Exposure (x$1,000)	0	32,400	0	0	0	9,144	9,144	0	0	0	63,048	**113,736**
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	0	**4**
	Exposure (x$1,000)	0	25,730	0	0	0	0	0	0	0	0	0	**25,730**
Total Number		**3**	**1,144**	**11**	**18**	**32**	**56**	**77**	**0**	**3**	**12**	**65**	**1,421**
Total Exposure (x $1,000)		**54,690**	**7,543,080**	**23,790**	**36,000**	**12,268,000**	**170,688**	**234,696**	**0**	**2,159,379**	**1,829,730**	**2,990,192**	**27,310,245**

TABLE 57: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM 500-YEAR FLOOD HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	13	7	1	**21**
	Exposure (x$1,000)	83,915	4,681	342	**88,938**
Chula Vista	Total KMs	68	8	5	**81**
	Exposure (x$1,000)	454,289	5,173	7,439	**466,901**
Coronado	Total KMs	2	3	0	**5**
	Exposure (x$1,000)	11,014	1,984	0	**12,998**
Del Mar	Total KMs	6	3	2	**11**
	Exposure (x$1,000)	38,837	1,972	2,965	**43,774**
El Cajon	Total KMs	49	3	4	**56**
	Exposure (x$1,000)	326,126	2,043	5,268	**333,437**
Encinitas	Total KMs	5	4	0	**9**
	Exposure (x$1,000)	32,741	2,620	0	**35,361**
Escondido	Total KMs	65	6	1	**72**
	Exposure (x$1,000)	431,452	4,162	752	**436,366**
Imperial Beach	Total KMs	1	1	0	**2**
	Exposure (x$1,000)	1,097	543	0	**1,640**
La Mesa	Total KMs	1	1	1	**3**
	Exposure (x$1,000)	3,158	281	180	**3,619**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	28	1	1	**30**
	Exposure (x$1,000)	188,912	405	414	**189,731**
Oceanside	Total KMs	94	12	11	**117**
	Exposure (x$1,000)	624,041	8,133	16,729	**648,903**
Otay Water District	Total KMs	38	4	0	**42**
	Exposure (x1000)	256,525	2,418	0	**258,943**
Padre Dam Municipal Water District	Total KMs	28	4	3	**35**
	Exposure (x1000)	184,247	2,915	5,218	**192,380**
Port of San Diego	Total KMs	9	2	9	**20**
	Exposure (x1000)	28,995	1,211	13,073	**43,279**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Poway	Total KMs	4	1	0	**5**
	Exposure (x$1,000)	23,390	198	0	**23,588**
Rainbow Municipal Water District	Total KMs	32	1	0	**33**
	Exposure (x$1,000)	212,499	844	0	**213,343**
San Diego (City)	Total KMs	367	3	67	**437**
	Exposure (x$1,000)	2,448,289	22,199	100,606	**2,571,094**
San Diego County Water Authority	Total KMs	859	89	94	**1,042**
	Exposure (x1000)	5,730,566	61,124	140,601	**5,932,291**
San Marcos	Total KMs	26	2	2	**30**
	Exposure (x$1,000)	172,749	1,393	3,617	**177,759**
San Miguel FPD	Total KMs	4	1	0	**5**
	Exposure (x$1,000)	24,494	759	0	**25,253**
Santee	Total KMs	25	4	1	**30**
	Exposure (x$1,000)	166,448	2,574	303	**169,325**
Solana Beach	Total KMs				**0**
	Exposure (x$1,000)				**0**
Sweetwater Authority	Total KMs	86	7	5	**98**
	Exposure (x$1,000)	574,882	4,765	7,853	**587,500**
Unincorporated	Total KMs	124	9	1	**134**
	Exposure (x$1,000)	823,809	5,942	1,070	**830,821**
Vista	Total KMs	25	1	1	**27**
	Exposure (x$1,000)	167,522	560	1,486	**169,568**
Vista Irrigation District	Total KMs	3	0	0	**3**
	Exposure (x$1,000)	20,253	0	0	**20,253**
Total Number		**1,962**	**177**	**209**	**2,348**
Total Exposure (x $1,000)		**13,030,250**	**138,899**	**307,916**	**13,477,065**

5.3.9. 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
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.

The first table below provides a breakdown of potential exposure for high-risk rain-induced landslide hazard by jurisdiction, and the second table below provides a breakdown of infrastructure and critical facility exposure for high risk. The third table provides a breakdown of potential exposure for moderate risk rain-induced landslide by jurisdiction, and the fourth table below provides a breakdown of potential infrastructure and critical facility exposure for moderate risk.

Approximately 181,501 people may be at risk from a rain-induced landslide hazard:

TABLE 58: POTENTIAL EXPOSURE FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine Fpd	292	2	777	0	0
Carlsbad	2,163	24	9,324	1	302,350
Chula Vista	865	0	0	0	0
Coronado	0	0	0	0	0
Del Mar	0	0	0	0	0
El Cajon	1,337	11	4,273	0	0
Encinitas	158	4	1,554	0	0
Escondido	4,372	76	29,526	3	907,050
Imperial Beach	0	0	0	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	0	0	0	0	0
Otay Water District	5,522	32	12,432	0	0
Padre Dam Municipal Water District	846	30	11,655	0	0
Port Of San Diego	0	0	0	0	0
Poway	574	0	0	0	0
Rainbow Municipal Water District	1,968	84	32,634	8	2,418,800
Rancho Santa Fe Fpd	10,853	3,285	1,276,223	226	68,331,100
San Diego	1,222	9	3,497	0	0
San Diego County Water Authority	68,465	5,076	1,972,026	270	81,634,500
San Marcos	8,693	943	366,356	12	3,628,200
San Miguel Fpd	1,773	48	18,648	0	0
Santee	8	11	4,274	1	302,350
Solana Beach	0	0	0		0
Sweetwater Authority	2,592	89	34,577	2	604,700
Unincorporated	51,594	4,300	1,670,550	259	78,308,650
Vista	2,782	21	8,159	1	302,350
Vista Irrigation District	1,733	68	26,418	2	604,700
Total	**167,812**	**14,113**	**5,482,903**	**785**	**237,344,750**

TABLE 59: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	RAIL	SCH	TOTAL
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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$1,000)	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$1,000)	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$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	0	47,000	0	0	0	0	0	0	0	0	**47,000**
Padre Dam Municipal Water District	Number	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	2,000	0	0	0	0	0	0	0	0	0	**2,000**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rancho Santa Fe FPD	Number	0	2	0	0	2	1	4	0	0	0	1	0	4	**14**
	Exposure (x$1,000)	0	13,340	0	0	94,000	3,048	12,192	0	0	0	163,612	0	218,078	**504,270**
San Diego County Water Authority	Number	0	2	0	4	3	2	4	0	0	0	1	0	4	**20**
	Exposure (x$1,000)	0	13,340	0	8,000	141,000	6,096	12,192	0	0	0	163,612	0	218,078	**562,318**
San Marcos	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	INFR	PORT	POT	RAIL	SCH	TOTAL
Santee	Number	0	0	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	0	0	2,000	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	2	0	3	3	1	4	0	0	0	1	0	4	**18**
	Exposure (x$1,000)	0	13,340	0	6,000	141,000	3,048	12,192	0	0	0	163,612	0	218,078	**557,270**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Total Number		**0**	**6**	**0**	**9**	**9**	**4**	**12**	**0**	**0**	**0**	**3**	**0**	**12**	**55**
Total Exposure (x $1,000)		**0**	**40,020**	**0**	**18,000**	**423,000**	**2,192**	**36,576**	**0**	**0**	**0**	**490,836**	**0**	**654,234**	**1,674,858**

TABLE 60: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM RAIN-INDUCED LANDSLIDE HAZARD (HIGH RISK) BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	246	0	**246**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	3	1	0	**4**
	Exposure (x$1,000)	17,437	635	0	**18,072**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Padre Dam Municipal Water District	Total KMs		1		**1**
	Exposure (x1000)		726		**726**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	14,962	887	0	**15,849**
Rancho Santa Fe FPD	Total KMs	15	1	0	**16**
	Exposure (x$1,000)	98,127	742	0	**98,869**
San Diego (City)	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,823	0	0	**2,823**
San Diego County Water Authority	Total KMs	37	6	0	**43**
	Exposure (x1000)	248,125	4,231	0	**252,356**
San Marcos	Total KMs	8	0	0	**8**
	Exposure (x$1,000)	55,696	0	0	**55,696**
San Miguel FPD	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	600	0	**600**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	139	0	**139**
Unincorporated	Total KMs	47	6	2	**55**
	Exposure (x$1,000)	311,472	3,962	2,442	**317,876**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Vista Irrigation District	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,020	0	0	**2,020**
Total Number		**114**	**19**	**2**	**135**
Total Exposure (x $1,000)		**750,662**	**12,168**	**2,442**	**765,272**

TABLE 61: POTENTIAL EXPOSURE TO RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	Exposed Population	Building Count	Potential Exposure (x$1,000)	Building Count	Potential Exposure (x$1,000)
Alpine Fpd	0	0	0	0	0
Carlsbad	0	0	0	0	0
Chula Vista	0	0	0	0	0
Coronado	0	0	0	0	0
Del Mar	0	0	0	0	0
El Cajon	177	57	22,145	2	605
Encinitas	60	4	1,554	0	0
Escondido	558	494	191,919	26	7,861
Imperial Beach	0	0	0	0	0
La Mesa	0	2	777	0	0
Lemon Grove	0	0	0	0	0
National City	0	64	24,864	1	302
Oceanside	0	0	0	0	0
Otay Water District	9,569	20,175	7,837,988	1,071	323,817
Padre Dam Municipal Water District	3,972	6,051	2,350,814	427	129,103
Port Of San Diego	0	0	0	0	0
Poway	0	0	0	0	0
Rainbow Municipal Water District	2,837	1,351	524,864	57	17,234
Rancho Santa Fe Fpd	16,246	11,707	4,548,170	684	206,807
San Diego	560	4	1,554	0	0
San Diego County Water Authority	115,920	103,190	40,089,315	6,267	1,894,827
San Marcos	258	150	58,275	5	1,512
San Miguel Fpd	23,999	41,324	16,054,374	2,186	660,937
Santee	0	0	0	0	0
Solana Beach	0	0	0	0	0
Sweetwater Authority	4,265	5,316	2,065,266	301	91,007
Unincorporated	115,732	102,862	39,961,887	6,279	1,898,456
Vista	0	66	25,641	2	605
Vista Irrigation District	4,182	5,802	2,254,077	454	137,267
Total	**298,335**	**298,619**	**116,013,484**	**17,762**	**5,307,340**

TABLE 62: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Carlsbad	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Otay Water District	Number	0	41	0	15	9	9	9	0	0	2	19	**104**
	Exposure (x$1,000)	0	273,470	0	30,000	2,907,000	27,432	27,432	0	0	193,612	3,621,338	**7,080,284**
Padre Dam Municipal Water District	Number	0	34	0	0	0	0	0	0	0	0	2	**36**
	Exposure (x$1,000)	0	226,780	0	0	0	0	0	0	0	0	114,552	**341,332**
Poway	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Rainbow Municipal Water District	Number	0	3	0	0	1	1	0	0	0	1	0	**6**
	Exposure (x$1,000)	0	20,010	0	0	875,000	3,048	0	0	0	30,000	0	**928,058**
Rancho Santa Fe FPD	Number	0	26	0	0	5	4	5	0	0	7	6	**53**
	Exposure (x$1,000)	0	173,420	0	0	1,063,000	12,192	15,240	0	0	878,059	370,874	**2,512,785**
San Diego (City)	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Diego County Water Authority	Number	0	245	0	21	28	31	28	0	0	14	56	**423**
	Exposure (x$1,000)	0	1,629,400	0	42,000	8,768,000	94,488	85,344	0	0	1,355,282	5,323,190	**17,297,704**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Marcos	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Santee	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
San Miguel FPD	Number	0	97	0	0	4	9	9	0	0	3	29	**151**
	Exposure (x$1,000)	0	646,990	0	0	188,000	27,432	27,432	0	0	223,612	4,117,656	**5,231,122**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Sweetwater Authority	Number	0	32	0	0	1	1	3	0	0	1	3	**41**
	Exposure (x$1,000)	0	213,440	0	0	47,000	3,048	9,144	0	0	30,000	98,494	**401,126**
Unincorporated	Number	0	250	0	21	30	31	28	0	0	15	56	**431**
	Exposure (x$1,000)	0	1,662,750	0	42,000	9,690,000	94,488	85,344	0	0	1,385,282	5,323,190	**18,283,054**
Vista	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Vista Irrigation District	Number	0	4	0	0	0	0	0	0	0	0	2	**6**
	Exposure (x$1,000)	0	25,730	0	0	0	0	0	0	0	0	91,464	**117,194**
Total Number		**0**	**733**	**0**	**57**	**78**	**86**	**82**	**0**	**0**	**43**	**173**	**1,252**
Total Exposure (x $1,000)		**0**	**4,878,660**	**0**	**114,000**	**23,538,000**	**262,128**	**249,936**	**0**	**0**	**4,095,847**	**19,060,758**	**52,199,329**

TABLE 63: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM RAIN-INDUCED LANDSLIDE HAZARD (MODERATE RISK) BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Carlsbad	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Chula Vista	Total KMs	1	0	0	**1**
	Exposure (x$1,000)	2,941	0	0	**2,941**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
El Cajon	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	11,578	95	0	**11,673**
Encinitas	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Escondido	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	23	0	0	**23**
	Exposure (x$1,000)	155,397	0	0	**155,397**
Oceanside	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Otay Water District	Total KMs	166	41	0	**207**
	Exposure (x$1,000)	1,309,054	28,206	0	**1,337,260**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water District	Total KMs	26	3	0	**29**
	Exposure (x1000)	171,195	2,376	0	**173,571**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Rainbow Municipal Water District	Total KMs	52	2	0	**54**
	Exposure (x$1,000)	346,138	1,174	0	**347,312**
Rancho Santa Fe FPD	Total KMs	43	5	0	**48**
	Exposure (x1000)	288,347	3,352	0	**291,699**
San Diego (City)	Total KMs	6	0	2	**8**
	Exposure (x$1,000)	40,763	0	2,312	**43,075**
San Diego County Water Authority	Total KMs	1,033	179	58	**1,270**
	Exposure (x1000)	6,888,284	122,442	87,479	**7,098,205**
San Marcos	Total KMs	2	1	0	**3**
	Exposure (x$1,000)	13,026	306	0	**13,332**
San Miguel FPD	Total KMs	215	49	0	**264**
	Exposure (x$1,000)	1,430,630	33,517	0	**1,464,147**
Santee	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Solana Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Sweetwater Authority	Total KMs	94	7	0	**101**
	Exposure (x$1,000)	629,031	4,909	0	**633,940**
Unincorporated	Total KMs	1,113	180	58	**1,351**
	Exposure (x$1,000)	7,424,405	122,740	87,336	**7,634,481**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista	Total KMs	1	0	1	**2**
	Exposure (x$1,000)	5,205	0	272	**5,477**
Vista Irrigation District	Total KMs	40	2	3	**45**
	Exposure (x$1,000)	268,108	1,566	4,609	**274,283**
Total Number		**2,817**	**470**	**122**	**3,409**
Total Exposure (x $1,000)		**18,984,102**	**320,683**	**182,008**	**19,486,793**

5.3.10. WILDFIRE/STRUCTURE FIRE

CDF-FRAP (California Department of Forestry and Fire Protection's Fire and Resource Assessment Program) modeled wildland fire threat for the state of California in 2002. This model was used in GIS to profile the fire hazard throughout the County and is described in detail below in the Vulnerability Assessment portion of this document. This data was updated as requested by the Encinitas jurisdiction and is reflected in the hazard modeling process and subsequent mapping.

It should be noted that the hazard level depicted within current data boundaries will change after the CDF re-evaluates burned areas. After this re-evaluation is complete, it is expected that the CDF-FRAP will remodel the fire risk and provide updated risk maps. These updated maps should be included in future revisions of this plan. In the model, fire threat is a combination of factors including:

1. Historical fire regime and fire regime condition class
2. Existing vegetation
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

Wildfire loss estimates were determined using the CDF-FRAP Wildfire Hazard Severity Zones data. CDF-FRAP modeled wildland fire threat for the state of California in 2008. This model was used in GIS to profile the fire hazard throughout the County, then used in overlays to determine the loss estimates. In the model, fire threat is a combination of two factors: 1) fire rotation, or the likelihood of a given area burning, and 2) potential fire behavior (fuel rank). These two factors were combined to create five threat classes ranging from little or no threat to very high. The fuel ranking methodology assigned ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under a given severe weather condition (wind speed, humidity, temperature, and fuel moisture).

The procedure made an initial assessment of rank based on as assigned fuel model and slope, then potentially increases ranks based on the amount of ladder and/or crown fuel present to arrive at a final fuel rank. Fire rotation class intervals were calculated from fifty years of fire history on land areas grouped into “strata” based on fire environment conditions. These strata are defined by climate, vegetation, and land ownership. The fire rotation interval is the number of years it would take for past fires to burn an area equivalent to the area of a given stratum. Fire rotation interval for a given stratum is calculated by dividing the annual number of acres burned into the total area of the stratum. Finally, fire rotation values were grouped into classes. The larger fire rotation values correspond to less frequent burning. CDF calculated a numerical index of fire threat based on the combination of fuel rank and fire rotation.

A 1-3 ranking of fuel rank was summed with the 1-3 ranking from rotation class to develop a threat index ranging from 2 to 6. This threat index was then grouped into four threat classes. Areas that do not support wildland fuels (e.g., open water, agriculture lands, etc.) were omitted from the calculation, however areas of very large urban centers (i.e., concrete jungles) were left in but received a moderate threat value. This data was updated as requested by the City of Encinitas to more accurately reflect their fire risks, and is reflected in the hazard modeling process and subsequent mapping.

The identified vulnerable assets were superimposed on top of this information, resulting in four risk/exposure estimates: 1) the aggregated exposure and building count at the parcel level for residential

and commercial occupancies, 2) the aggregated population at risk at the census block level, 3) the critical facilities at risk (schools, hospitals, airports, bridges, and other facilities of a critical nature), and 4) the critical infrastructure (major roadways, railways, and oil/gas pipelines) at risk. These results were then aggregated and presented by hazard risk level per jurisdiction.

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.

The tables below provide a breakdown of potential greatest exposures to the San Diego region:

TABLE 64: POTENTIAL EXPOSURE FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine FPD	14,696	4,961	1,927,845	84	25,397
Carlsbad	19,479	5,075	1,972,145	561	169,618
Chula Vista	15,354	2,583	1,003,754	64	19,350
Coronado	0	0	0	0	0
Del Mar	3,555	340	132,124	249	75,285
El Cajon	13,057	1,523	591,838	7	2,116
Encinitas	11,633	3,801	1,476,689	89	26,909
Escondido	33,762	4,639	1,802,715	148	44,748
Imperial Beach	0	0	0	0	0
La Mesa	106	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	14,768	1,823	708,418	128	38,701
Otay Water District	25,962	6,989	2,715,925	383	115,800
Padre Dam Municipal Water District	68,029	14,780	5,743,508	802	242,485
Port Of San Diego	0	0	0	0	0
Poway	25,892	5,326	2,069,684	569	172,037
Rainbow Municipal Water District	11,651	4,168	1,619,685	60	18,141
Rancho Santa Fe Fpd	27,114	3,586	1,393,520	173	52,307
San Diego	341,251	123,699	48,069,431	3,517	1,063,365
San Diego County Water Authority	791,081	203,245	78,981,007	8,821	2,667,029
San Marcos	41,364	7,043	2,736,910	355	107,334
San Miguel Fpd	21,741	4,418	1,716,835	157	47,469
Santee	17,792	4,673	1,815,928	115	34,770
Solana Beach	2,538	579	224,999	25	7,559
Sweetwater Authority	734	0	0	78	23,583
Unincorporated	322,758	52,594	20,438,028	3,708	1,121,114
Vista	21,628	1,680	652,848	279	84,356
Vista Irrigation District	20,066	1,497	581,734	54	16,327
Total	**1,866,011**	**459,022**	**178,375,570**	**20,426**	**6,175,800**

Wildfire dataset provided by City of Encinitas for Very High Fire Hazard Severity Zones

TABLE 65: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine PFD	Number	0	34	0	0	1	0	3	0	0	0	4	**42**
	Exposure (x$1,000)	0	226,780	0	0	47,000	0	9,144	0	0	0	114,922	**397,846**
Carlsbad	Number	0	7	0	0	1	4	2	0	0	1	2	**17**
	Exposure (x$1,000)	0	46,690	0	0	47,000	12,192	6,096	0	0	163,612	108,188	**383,778**
Chula Vista	Number	0	0	0	0	1	1	0	0	0	0	0	**2**
	Exposure (x$1,000)	0	0	0	0	47,000	3,048	0	0	0	0	0	**50,048**
Coronado	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
El Cajon	Number	0	2	0	0	0	1	0	0	0	0	6	**9**
	Exposure (x$1,000)	0	13,340	0	0	0	3,048	0	0	0	0	6,997,070	**7,013,458**
Encinitas	Number	0	4	0	0	0	0	0	0	0	1	1	**5**
	Exposure (x$1,000)	0	22,880	0	0	0	0	0	0	0	163,612	51,948	**78,628**
Escondido	Number	0	11	0	0	0	0	0	0	0	1	1	**13**
	Exposure (x$1,000)	0	73,370	0	0	0	0	0	0	0	30,000	42,106	**145,476**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	1	1	0	0	0	1	1	0	0	0	1	**5**
	Exposure (x$1,000)	86,701	6,670	0	0	0	3,048	3,048	0	0	0	37,518	**136,985**
Otay Water District	Number	0	16	0	15	11	4	6	0	0	2	8	**62**
	Exposure (x$1,000)	0	106,720	0	30,000	3,001,000	12,192	18,288	0	0	193,612	474,192	**3,836,004**
Padre Dam Municipal Water District	Number	0	47	0	0	1	4	4	0	0	1	16	**73**
	Exposure (x$1,000)	0	313,490	0	0	47,000	12,192	12,192	0	0	163,612	7,396,966	**7,945,452**
Poway	Number	0	32	0	0	3	1	1	0	0	6	3	**46**
	Exposure (x$1,000)	0	213,440	0	0	141,000	3,048	3,048	0	0	180,000	155,918	**696,454**
Rainbow Municipal Water District	Number	0	33	0	1	2	2	1	0	0	0	1	**40**
	Exposure (x$1,000)	0	220,110	0	2,000	922,000	6,096	3,048	0	0	0	14,430	**1,167,684**
Rancho Santa Fe FPD	Number	0	8	0	0	4	0	0	0	0	3	0	**15**
	Exposure (x$1,000)	0	53,360	0	0	1,016,000	0	0	0	0	193,612	0	**1,262,972**
San Diego (City)	Number	1	260	2	21	34	18	14	1	0	4	70	**425**
	Exposure (x$1,000)	20,137	1,716,150	3,660	42,000	8,222,000	54,864	42,672	16,629	0	387,223	15,821,496	**26,326,831**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Diego County Water Authority	Number	1	457	2	53	59	49	33	4	0	26	119	**803**
	Exposure (x$1,000)	106,837	3,026,340	3,660	106,000	13,537,000	149,352	100,584	33,259	0	1,982,505	37,210,012	**56,255,550**
San Marcos	Number	0	1	0	2	1	1	0	0	0	0	12	**17**
	Exposure (x$1,000)	0	6,670	0	4,000	857,000	3,048	0	0	0	0	12,941,120	**13,811,838**
San Miguel FPD	Number	0	2	0	0	2	1	3	0	0	2	3	**13**
	Exposure (x$1,000)	0	13,340	0	0	94,000	3,048	9,144	0	0	193,612	71,780	**384,924**
Santee	Number	0	2	0	0	0	0	1	0	0	1	2	**6**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	163,612	152,366	**332,366**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Unincorporated	Number	0	258	0	33	37	44	33	0	0	15	34	**454**
	Exposure (x$1,000)	0	1,701,860	0	66,000	6,707,000	131,064	100,584	0	0	1,118,059	1,029,784	**10,854,351**
Vista	Number	0	2	0	0	0	1	0	0	0	0	0	**3**
	Exposure (x$1,000)	0	13,340	0	0	0	3,048	0	0	0	0	0	**16,388**
Total Number		**3**	**1,177**	**4**	**125**	**157**	**132**	**102**	**5**	**0**	**63**	**183**	**2,050**
Total Exposure (x $1,000)		**213,675**	**7,787,890**	**7,320**	**250,000**	**34,685,000**	**399,288**	**310,896**	**49,888**	**0**	**4,933,071**	**82,619,816**	**131,097,033**

Wildfire dataset provided by City of Encinitas for Very High Fire Hazard Severity Zones

TABLE 66: POTENTIAL EXPOSURE TO INFRASTRUCTURE FROM VERY HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	65	3	0	**68**
	Exposure (x$1,000)	434,832	2,268	0	**437,100**
Carlsbad	Total KMs	61	13	0	**74**
	Exposure (x$1,000)	407,897	8,578	0	**416,475**
Chula Vista	Total KMs	41	4	0	**45**
	Exposure (x$1,000)	273,960	2,566	0	**276,526**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	0	1	0	**1**
	Exposure (x$1,000)	0	652	0	**652**
El Cajon	Total KMs	16	2	0	**18**
	Exposure (x$1,000)	107,171	1,079	0	**108,250**
Encinitas	Total KMs	21	10	0	**24**
	Exposure (x$1,000)	65,575	6,717	0	**140,769**
Escondido	Total KMs	40	9	0	**49**
	Exposure (x$1,000)	267,984	6,149	0	**274,133**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	14	3	0	**17**
	Exposure (x$1,000)	90,850	2,180	0	**93,030**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Otay Water District	Total KMs	216	24	0	**240**
	Exposure (x1000)	1,438,065	16,706	0	**1,454,771**
Padre Dam Municipal Water District	Total KMs	137	22	0	**159**
	Exposure (x1000)	911,453	14,984	0	**926,437**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	58	4	0	**62**
	Exposure (x$1,000)	388,142	2,414	0	**390,556**
Rainbow Municipal Water District	Total KMs	262	11	0	**273**
	Exposure (x1000)	1,744,280	7,763	0	**1,752,043**
Rancho Santa Fe FPD	Total KMs	14	2	0	**16**
	Exposure (x$1,000)	93,346	1,630	0	**94,976**
San Diego (City)	Total KMs	1,934	126	56	**2,116**
	Exposure (x$1,000)	12,894,842	85,728	83,589	**13,064,159**
San Diego County Water Authority	Total KMs	3,316	292	89	**3,697**
	Exposure (x1000)	22,108,904	199,668	133,388	**22,441,960**
San Marcos	Total KMs	40	2	1	**43**
	Exposure (x$1,000)	266,929	1,183	1,642	**269,754**
San Miguel FPD	Total KMs	51	21	0	**72**
	Exposure (x$1,000)	338,443	14,334	0	**352,777**
Santee	Total KMs	33	2	0	**35**
	Exposure (x$1,000)	223,061	1,448	0	**224,509**
Solana Beach	Total KMs	9	3	1	**13**
	Exposure (x$1,000)	61,678	1,776	254	**63,708**
Unincorporated	Total KMs	2,185	123	90	**2,398**
	Exposure (x$1,000)	14,569,105	83,698	134,264	**14,787,067**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista	Total KMs	13	3	0	**16**
	Exposure (x$1,000)	87,845	1,723	0	**89,568**
Vista Irrigation District	Total KMs	12	0	1	**13**
	Exposure (x$1,000)	79,247	0	535	**79,782**
Total Number		**8,538**	**680**	**238**	**9,449**
Total Exposure (x $1,000)		**58,853,609**	**463,244**	**353,672**	**57,739,002**

TABLE 67: POTENTIAL EXPOSURE FROM HIGH WILDFIRE HAZARD BY JURISDICTION

		Residential Buildings at Risk		Commercial Buildings at Risk	
Jurisdiction	**Exposed Population**	**Building Count**	**Potential Exposure (x$1,000)**	**Building Count**	**Potential Exposure (x$1,000)**
Alpine FPD	991	788	306,138	138	41,724
Carlsbad	24,365	8,513	3,307,301	238	71,959
Chula Vista	8,464	2,863	1,112,276	57	17,234
Coronado	0	0	0	0	0
Del Mar	940	255	99,068	8	2,419
El Cajon	1,131	168	65,268	20	6,047
Escondido	9,189	1,629	632,867	76	22,979
Imperial Beach	0	6	2,331	0	0
La Mesa	0	0	0	0	0
Lemon Grove	0	0	0	0	0
National City	0	0	0	0	0
Oceanside	18,152	5,128	1,992,228	144	43,538
Otay Water District	15,736	4,372	1,698,522	355	107,334
Padre Dam Municipal Water District	11,393	3,746	1,455,321	284	85,867
Port Of San Diego	0	0	0	0	0
Poway	7,010	1,974	766,899	202	61,075
Rainbow Municipal Water District	4,867	2,021	785,159	63	19,048
Rancho Santa Fe FPD	11,976	2,456	954,156	103	31,142
San Diego	30,619	9,281	3,605,669	1,427	431,453
San Diego County Water Authority	224,927	55,177	21,436,265	3,591	1,085,739
San Marcos	11,262	5,276	2,049,726	124	37,491
San Miguel FPD	5,147	1,672	649,572	263	79,518
Santee	7,644	2,047	795,260	75	22,676
Solana Beach	954	505	196,193	15	4,535
Sweetwater Authority	491	472	183,372	21	6,349
Unincorporated	98,697	16,146	6,272,721	1,157	349,819
Vista	15,117	999	388,112	88	26,607
Vista Irrigation District	8,960	674	261,849	36	10,885
Total	**518,032**	**126,168**	**49,016,273**	**8,485**	**2,565,438**

TABLE 68: POTENTIAL EXPOSURE TO CRITICAL FACILITIES FROM HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
Alpine FPD	Number	0	3	0	0	0	2	0	0	0	0	1	**6**
	Exposure (x$1,000)	0	20,010	0	0	0	6,096	0	0	0	0	18,722	**44,828**
Carlsbad	Number	0	9	0	0	0	0	2	0	0	1	7	**19**
	Exposure (x$1,000)	0	60,030	0	0	0	0	6,096	0	0	163,612	452,436	**682,174**
Chula Vista	Number	0	3	1	0	0	0	1	0	0	0	1	**6**
	Exposure (x$1,000)	0	20,010	1,830	0	0	0	3,048	0	0	0	42,550	**67,438**
Coronado	Number	0	1	0	0	0	0	0	0	0	0	0	**1**
	Exposure (x$1,000)	0	6,670	0	0	0	0	0	0	0	0	0	**6,670**
Del Mar	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Escondido	Number	0	0	0	1	2	0	0	0	0	1	3	**7**
	Exposure (x$1,000)	0	0	0	2,000	1,750,000	0	0	0	0	163,612	98,346	**2,013,958**
Imperial Beach	Number	0	0	0	0	0	0	0	0	0	0	0	**0**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	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**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	0	**0**
Oceanside	Number	0	7	0	0	1	2	1	0	0	1	3	**15**
	Exposure (x$1,000)	0	46,690	0	0	47,000	6,096	3,048	0	0	163,612	125,060	**391,506**
Otay Water District	Number	0	8	1	0	2	3	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	53,360	1,830	0	922,000	9,144	3,048	0	0	0	201,428	**1,190,810**
Padre Dam Municipal Water District	Number	0	12	0	0	0	2	1	0	0	0	2	**17**
	Exposure (x$1,000)	0	80,040	0	0	0	6,096	3,048	0	0	0	72,372	**161,556**
Poway	Number	0	7	0	0	1	0	0	0	0	2	0	**10**
	Exposure (x$1,000)	0	46,690	0	0	47,000	0	0	0	0	60,000	0	**153,690**
Rainbow Municipal Water District	Number	0	7	0	0	0	0	0	0	0	0	0	**7**
	Exposure (x$1,000)	0	46,690	0	0	0	0	0	0	0	0	0	**46,690**
Rancho Santa Fe FPD	Number	0	6	0	0	0	2	0	0	0	0	3	**11**
	Exposure (x$1,000)	0	40,020	0	0	0	6,096	0	0	0	0	246,864	**292,980**
San Diego (City)	Number	2	14	0	0	0	1	1	0	0	0	2	**20**
	Exposure (x$1,000)	161,960	93,380	0	0	0	3,048	3,048	0	0	0	221,852	**483,288**
San Diego County Water Authority	Number	1	94	1	1	12	12	11	0	0	7	35	**174**
	Exposure (x$1,000)	344,057	622,230	1,830	2,000	3,876,000	36,576	33,528	0	0	878,059	2,012,874	**7,807,154**

Jurisdiction	Data	AIR	BRDG	BUS	COM	ELEC	EMER	GOVT	HOSP	PORT	POT	SCH	TOTAL
San Marcos	Number	0	2	0	0	0	0	1	0	0	0	3	**6**
	Exposure (x$1,000)	0	13,340	0	0	0	0	3,048	0	0	0	264,624	**281,012**
San Miguel FPD	Number	0	7	0	0	1	1	1	0	0	0	1	**11**
	Exposure (x$1,000)	0	46,690	0	0	47,000	3,048	3,048	0	0	0	158,878	**258,664**
Santee	Number	0	2	0	0	0	0	0	0	0	0	1	**3**
	Exposure (x$1,000)	0	13,340	0	0	0	0	0	0	0	0	53,650	**66,990**
Solana Beach	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	24,864	**24,864**
Sweetwater Authority	Number	0	6	0	0	0	0	1	0	0	0	1	**8**
	Exposure (x$1,000)	0	40,020	0	0	0	0	3,048	0	0	0	33,004	**76,072**
Unincorporated	Number	1	79	0	0	12	10	6	0	0	2	16	**126**
	Exposure (x$1,000)	196,513	517,430	0	0	2,220,000	30,480	18,288	0	0	327,223	727,346	**4,037,280**
Vista	Number	0	0	0	0	0	0	0	0	0	0	1	**1**
	Exposure (x$1,000)	0	0	0	0	0	0	0	0	0	0	48,396	**48,396**
Total Number		**4**	**267**	**3**	**2**	**31**	**35**	**27**	**0**	**0**	**14**	**83**	**466**
Total Exposure (x $1,000)		**702,530**	**1,766,640**	**5,490**	**4,000**	**8,909,000**	**106,680**	**82,296**	**0**	**0**	**1,756,118**	**4,803,266**	**19,806,356**

TABLE 69: POTENTIAL EXPOSURE TO INFRASTRUCTURES FROM HIGH WILDFIRE HAZARD BY JURISDICTION

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Alpine FPD	Total KMs	6	1	0	**7**
	Exposure (x$1,000)	38,043	595	0	**38,638**
Carlsbad	Total KMs	129	24	0	**153**
	Exposure (x$1,000)	861,708	16,189	0	**877,897**
Chula Vista	Total KMs	33	2	0	**35**
	Exposure (x$1,000)	218,981	1,024	0	**220,005**
Coronado	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Del Mar	Total KMs	1	2	1	**4**
	Exposure (x$1,000)	2,219	1,200	257	**3,676**
El Cajon	Total KMs	3	1	0	**4**
	Exposure (x$1,000)	23,274	438	0	**23,712**
Escondido	Total KMs	20	2	0	**22**
	Exposure (x$1,000)	135,087	1,550	0	**136,637**
Imperial Beach	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
La Mesa	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Lemon Grove	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
National City	Total KMs	0	0	0	**0**
	Exposure (x$1,000)	0	0	0	**0**
Oceanside	Total KMs	50	4	0	**54**
	Exposure (x$1,000)	330,311	2,580	0	**332,891**
Otay Water District	Total KMs	84	10	0	**94**
	Exposure (x1000)	559,789	6,922	0	**566,711**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Padre Dam Municipal Water District	Total KMs	24	3	0	**27**
	Exposure (x1000)	161,849	2,232	0	**164,081**
Port of San Diego	Total KMs	0	0	0	**0**
	Exposure (x1000)	0	0	0	**0**
Poway	Total KMs	14	1	0	**15**
	Exposure (x$1,000)	96,648	227	0	**96,875**
Rainbow Municipal Water District	Total KMs	35	2	0	**37**
	Exposure (x1000)	235,403	1,607	0	**237,010**
Rancho Santa Fe FPD	Total KMs	14	1	0	**15**
	Exposure (x$1,000)	95,745	432	0	**96,177**
San Diego (City)	Total KMs	130	6	2	**138**
	Exposure (x$1,000)	864,555	4,184	2,817	**871,556**
San Diego County Water Authority	Total KMs	683	119	19	**821**
	Exposure (x1000)	4,553,847	81,510	28,331	**4,663,688**
San Marcos	Total KMs	40	1	3	**44**
	Exposure (x$1,000)	267,402	843	5,094	**273,339**
San Miguel FPD	Total KMs	24	2	0	**26**
	Exposure (x$1,000)	163,233	1,433	0	**164,666**
Santee	Total KMs	13	2	0	**15**
	Exposure (x$1,000)	87,222	1,340	0	**88,562**
Solana Beach	Total KMs	1	2	1	**4**
	Exposure (x$1,000)	1,572	1,282	701	**3,555**
Sweetwater Authority	Total KMs	1	3	0	**4**
	Exposure (x$1,000)	6,227	2,058	0	**8,285**
Unincorporated	Total KMs	420	71	32	**523**
	Exposure (x$1,000)	2,798,149	48,323	47,473	**2,893,945**

Jurisdiction	Data	HWY	OIL GAS	RR	TOTAL
Vista	Total KMs	12	2	0	**14**
	Exposure (x$1,000)	83,218	1,463	0	**84,681**
Vista Irrigation District	Total KMs	2	0	0	**2**
	Exposure (x$1,000)	14,101	0	0	**14,101**
Total Number		**1,739**	**261**	**58**	**2,058**
Total Exposure (x $1,000)		**11,598,583**	**177,432**	**84,673**	**11,860,688**

5.3.11. HUMAN-CAUSED HAZARDS

The vulnerability assessment information for human-caused hazards is considered sensitive homeland security information and is provided in a separate, confidential document (Attachment A).

5.3.12. CLIMATE CHANGE (EXTREME HEAT, DROUGHT, COMPOUNDING EVENTS)

The following paragraphs provide an assessment summary of Climate Change impacts and threats to people and property in the San Diego region, provided by planning partners from Scripps Institution of Oceanography (more sources are listed in this plan's appendices): [144]

Scripps Institution of Oceanography Assessment Summary

Community adaptations to climate change should best be conducted with an awareness of the existing local climate, along with spatially specific climate projections. This section summarizes and updates findings of the San Diego Region Report (Kalansky et al., 2018) and the San Diego County Ecosystems Report (Jennings et al., 2018) which have recently synthesized the current state of the science and understanding of the impacts from climate variability and future climate change in the region. The section will be organized by key climate-related phenomena: temperature, precipitation, Santa Ana winds and wildfires, coastal low clouds, and sea level. The section concludes by discussing compounding extreme events.

Warming Temperature, Extreme Heat, and Drought

As has been projected across California (Pierce et al., 2018), models indicate that temperature in San Diego will warm progressively through the 21st Century. By the end of the 21st Century, the projected warming ranges from 4˚F to 9˚F, with magnitude depending greatly upon global greenhouse gas emissions. Warming is projected to be greater in late summer and early fall than in other months of the year, and this monthly difference is more pronounced for minimum daily temperatures and under a non-mitigated greenhouse gas emission scenario (RCP 8.5). Because the oceans warm more slowly than land masses, temperature increases along the coast are projected to be about 1˚F less than other locations throughout the region.

The most severe impacts of rising temperature will likely result during occurrences of weather patterns that cause extreme heat. Heat waves have impacts on human health, ecosystems, agriculture, energy demand, and infrastructure. By the end of the century, similar to the average temperature change, the hottest day of the year is projected to increase by 4-9˚F depending on the greenhouse gas emission scenario. The frequency, or the probability of a heat wave occurrence, does not necessarily follow background warming however (Guirguis et al., 2018). For example, under 6˚F of warming, nighttime frequency of heat waves is projected to increase by approximately 51% in the coastal zone, while that of daytime heat waves is only projected to increase by 23% (Jennings et al., 2018). Unlike the coasts, the local mountains, such as Cuyamaca have a similar increase (~30%) in the probability of nighttime and daytime heat waves.

This contrast is a result of differences in the number of days of extreme temperature (long warm tails). Relative to background warming, which is projected to be stronger inland than at the coast, scientists (Gershunov & Guirguis, 2012) have projected more intense future heat waves along the coast compared to inland areas. In San Diego, as in the rest of California, coastal low clouds modulate temperatures by providing a cooling effect (Iacobellis & Cayan, 2013) while their absence can boost heat waves relative to normal temperatures (Clemesha et al., 2018). This relationship has an impact on projections of heatwaves; however, the sensitivity of coastal low clouds to climate change is complicated and is an area of active research at present. Moreover, winter Santa Ana wind-driven coastal heat wave activity is on the rise (Gershunov et al. 2021) and these events are known to carry a health burden (Schwarz et al. 2020).

The San Diego Region Report highlighted that the most vulnerable populations to health impacts from extreme events, such as heatwaves, are those who lack resources or are uninsured, are socially isolated, or

[144] 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

whose health is already compromised. For example, cardiovascular and respiratory illnesses are exacerbated by heat and air pollution (Analitis et al., 2014) and psychiatric illness has been shown to triple the risk of death from extreme heat (Bouchama et al., 2007). Heatwaves increase morbidity and mortality as was seen with the July 2006 heat wave in California, which exhibited unprecedented magnitude and unusually high humidity levels (Gershunov et al., 2009). The 2006 extreme heat wave resulted in over 600 excess deaths (Ostro et al., 2009), over 1200 excess hospitalizations for cardiovascular and other diseases (Guirguis et al., 2014), and over 16,000 excess emergency-department visits (Knowlton et al., 2009). In addition, recent research since the San Diego report has shown heat waves in the week prior can cause preterm birth (Ilango et al., 2020) and significant increases in renal hospital admissions for urinary tract infection, septicemia (blood poisoning), urinary stones, and composite kidney disease (Malig et al., 2019).

Throughout California and in San Diego, the effect of high apparent temperature, a combination of hot temperatures and high humidity, can have a greater impact in mortality (heat-related deaths) in coastal areas than inland areas (Basu, 2009). Guirguis et al, (2018, 2014) found that higher daily rates of heat wave-related hospitalization in coastal areas was caused by a lack of air conditioning, while community members in inland areas more often did have air conditioning. Building on this, McElroy et al. (McElroy et al., 2020), examined heat wave definitions (length, threshold percentiles and nighttime versus daytime temperature) and found that community members in climatologically warmer inland and desert climate zones in San Diego had more hospitalizations during heatwaves that had high nighttime warming, as compared to community members in the coastal zone. Both studies underscore the need for heat warning systems that account for differences in the climate zones throughout San Diego.

Furthermore, 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. Both 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. 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. An additional threat to water supply is the vulnerability of the levees protecting the California Delta, which feeds the State Water Project.

While the San Diego region's water supply is likely to decrease, water demand is expected to also increase approximately 29% by 2050 due to economic growth and population pressures. 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.

In Southern California, high temperatures also have great impacts on energy and transportation. A study of Los Angeles, which examined vulnerabilities of energy infrastructure at the neighborhood level, estimated losses up to 20% of peak demand safe operating electrical system capacity during projected extreme temperatures at the end of the century. High temperatures in neighboring San Diego County are expected to have similar impacts. Possible adaptations identified for the Los Angeles case, including higher density housing and reduction of sunlight absorbed (increasing albedo) are relevant for the San Diego region (Burillo et al., 2018, 2019). Data relating to temperature impacts on transportation in Southern California is limited, but studies elsewhere indicate that high temperatures must be included as design criteria in order to avoid damage to roads and rail lines (Sias-Daniel et al., 2014).

Research is advancing on effective adaptations to help combat the impact of heat. As Guirguis et al. (2018) showed, access to air conditioning can help prevent hospitalizations during extreme heat events. People living in hotter areas within cities have suffered an overall 6% higher risk of mortality/ morbidity compared to those in cooler areas, and those living in less vegetated areas had 5% higher risk compared to those living in more vegetated areas (Schinasi et al., 2018). In Los Angeles, increases in roof albedo, through light-colored reflecting roof surface treatments, reduces near-surface air temperature (Mohegh et al., 2018). With respect to infrastructure, the increase of solar energy generation in San Diego will help to offset increased electricity demand during hot sunny days, although this local source of energy will not help to satisfy nighttime energy needs for air conditioning on hot nights, and will be less effective during, cloudy, hot and

often humid days. The addition of batteries can extend solar power's ability to provide energy during nighttime and on cloudy days.

Highly Volatile Precipitation

Precipitation in Southern California has the highest year-to-year variability of any place in the continental U.S (Dettinger et al., 2011). In the San Diego region this variability is exemplified by the unusually wet water years of 2005, 2011, and 2017 and the droughts of 2001-2004, 2007-2010 and 2012-2016. As is the case for Northern California (Dettinger & Cayan, 2014), the high year-to-year variability in San Diego County is driven by extreme precipitation events, wherein days with precipitation at or exceeding the 95th percentile account for 80% of the year-to-year variability in annual total precipitation (Jennings et al., 2018). The heaviest events mostly occur in winter, although the region occasionally experiences high rainfall events from tropical storms or convective rainfall patterns during late summer and early fall. Large spatial variability adds to the complexity of the climate regime in the region. Mean annual precipitation ranges widely in San Diego County, between approximately 8-36 inches with most differences resulting from topographic influences - most precipitation on the west and south facing slopes and least in the rain shadow of the local mountains.

Model projections indicate that precipitation in California will become even more variable in future decades. While days with measurable precipitation become less frequent in Southern California (Pierce et al., 2013; Polade et al., 2014), extreme precipitation events will intensify (Polade et al., 2017). By the end of the century, the average wettest day every five years is projected to increase by 10-30%. Driving the precipitation regime change are atmospheric rivers, which are transports of moisture from the tropics over the Pacific Ocean in long, thin streams of moisture, like rivers in the sky. Precipitation from atmospheric rivers is projected to increase in the future, while precipitation from other forms of precipitation is projected to decrease. This tendency is particularly evident for the most extreme events — model projections suggest the strongest increases in the wettest 1% of days, nearly all of which are found to be atmospheric rivers (Gershunov et al., 2019).

Atmospheric rivers are projected to be associated with floods, annual maximum flow events, 8% more often in the end of the century as compared to 1950-2000 (Cao et al., 2020). Historically atmospheric rivers have caused the greatest flood damages to property in California and elsewhere along the West Coast as compared to other types of storms (Corringham et al., 2019). Also, coastal runoff created by atmospheric rivers has been shown to result in fecal pollution in coastal waters (Aguilera et al., 2019). In future decades, projected increases in precipitation from atmospheric rivers will likely increase both the flood damages and water pollution as a result of the extreme precipitation.

The average of several climate models project that Southern California will be drier in the future. However, the models project a range of changes in annual precipitation, due to differences in the representation of atmospheric circulation changes across different global climate models, and to the highly variable nature of the San Diego precipitation (Gershunov et al., 2019). Drought, both interannual and annual, impacts ecosystems and enhances wildfire risk. The recent 2012-2016 drought may be an early form of future droughts in California, not only having diminished annual precipitation amounts, but also featuring temperatures exceeding historical levels.

This combination of warming and drying results in greater evaporative demand from plants and the land surface, which exacerbates the drought (McEvoy et al., 2020; Williams et al., 2015). While reductions of annual precipitation are somewhat uncertain, the increase in temperature is baked into the future because of greenhouse gas accumulation in the atmosphere. The strong likelihood of warming continuing through future decades would indicate that enhanced evapotranspiration and landscape drying are quite certain. Because of this, future projections of drought that incorporate the evapotranspiration as well as precipitation project more multi-year droughts relative to projections of drought that only include precipitation (Kalansky et al. 2018; McEvoy et al., 2020).

Ecosystems have adapted to the high variability of San Diego’s hydroclimate, but this variability is projected to increase. The recent 2012-2016 drought showed that certain species were more susceptible to multi-year

droughts than others (Venturas et al., 2016). Meanwhile, recurrent drying, along with persistent warming since 1999 has pushed the Southwest toward “mega drought” (Williams et al., 2020). Extreme drought has the potential to intensify and change community composition and structure of ecosystems. Drought has severe consequences because it operates at spatial scales larger than other disturbances such as fire (Jennings et al., 2018).

Adding to impacts caused by interannual drought, the seasonal drought that is characteristic of the Mediterranean climate is projected to become longer with reduced precipitation in the shoulder seasons, spring, and fall. Such a shift toward a narrower precipitation season would stress some plant communities because spring features the largest increases in biomass for many plants due to the availability of moisture as well as the longer daylight hours (Parker et al., 2016). Thus, the projected spring drying has the potential to limit the growth of plants during their primary growing season. The largest impact of fall drying might likely be the increased occurrence of dry live and dry fuels during the season when Santa Ana winds occur, which would intensify the fall wildfire season.

Growing Threats of Wildfire from Warmer Climate and Santa Ana Winds

Santa Ana conditions erase the presence of the North Pacific air mass that usually blankets San Diego County. Santa Ana events typically last a few days and often carry strong and gusty winds from east or northeast directions that produce extreme dryness. Santa Ana Winds bring some of the highest winds experienced by many parts of San Diego County. Peaking in early winter, Santa Ana winds originate in the elevated Great Basin as cool air masses and are pushed southwestward by a synoptic pressure gradient creating offshore winds throughout San Diego (Hughes & Hall, 2010).

Clear skies are typically associated with Santa Ana wind events as the offshore winds blow air pollution offshore (Aguilera et al., 2020a). Some Santa Anas are quite cool, owing to their origins from cold dry Great Basin air masses, but the majority of Santa Anas are warm. In fact, hot, dry Santa wind events have accounted for many of the extremely warm (99th percentile) days within the September through May period: 90% of the warm extremes in winter, 30% in fall and 40% in spring. These non-summer heatwaves increase hospitalizations for dehydration, renal failure and stroke (McElroy et al., 2020).

San Diego’s highest wildfire risk occurs during Santa Ana winds. In recent years, the region suffered some of California’s largest conflagrations, including the September 1970 Laguna fire (175,425 acres burned), the October 2003 Cedar fire (273,246 acres burned) and the October 2007 Witch (197,990 acres burned) and Harris (90,440 acres burned) fires, all fanned by Santa Ana winds. The Santa Ana season typically commences in October, when vegetation is driest. An ignition of parched vegetation under this strong, gusty, dry wind causes wildfires that are extremely difficult if not impossible to control. This explains the timing of the peak of the traditional southern California wildfire season — October — when the Santa Ana season starts and before the first rainstorms of winter. During fires under Santa Ana conditions, air pollution (particulate matter under 2.5 microns - PM2.5) increases throughout San Diego and PM2.5 from wildfire is up to 10 times more harmful than air pollution from other sources (Aguilera et al., 2020b).

In addition to the personal safety, infrastructure and public health hazards posed by wildfires, San Diego ecosystems are also sensitive to too frequent fires. A growing risk in a warmer, fire-prone climate is the conversion of woody chaparral and coastal sage shrublands to grasses and other weedy herbaceous vegetation (Syphard et al., 2018), or the conversion from native coniferous forests to shrublands or exotic grasslands (Franklin, 2010).

Climate model projections of Santa Ana winds indicate that their activity could decrease in the warmer future. In the second half of the century under a non-reduction of greenhouse gas emission scenario (RCP 8.5) Santa Ana wind frequency is projected to decrease by between 8-20% and winds speeds between 5-10% relative to a historical period of 1950-1999. Further, the Santa Ana activity is projected to decrease mainly in the shoulder seasons, fall and spring, relative to winter (Guzman-Morales & Gershunov, 2019). The decrease in Santa Ana wind activity in the fall may help mitigate future wildfire risk resulting from drier autumns and more frequent multi-year droughts.

On the other hand, projected delays in the wet season (Pierce et al., 2013) would extend the presence of dry vegetation into the December peak of Santa Ana wind activity (Guzman-Morales et al., 2016) which will always see more frequent Santa Ana winds than October ever did (Guzman-Morales & Gershunov, 2019).

December fires could occasionally be fanned by back-to-back Santa Ana wind events and have the potential to grow to unprecedented proportions. These were the antecedent conditions that led to the Lilac Fire in San Diego and one of the largest fires in California history, the Thomas Fire, which burned in Ventura and Santa Barbara. The Thomas Fire continued to burn throughout most of December 2017 and into January 2018, when its smoldering remains were finally put out by the first significant rain of the season — an atmospheric river, which caused deadly debris flows.

A later start of the wet season is already apparent in the observations, while a decrease in Santa Ana wind activity has not yet emerged from the natural variability (Williams et al., 2019). Moreover, there are hot and cold flavors of the Santa Ana (Gershunov et al. 2021), of which the hot SAWs spread the largest wildfires. Research yet needs to be carried out to understand the possibly differential impact of climate change on the two flavors of SAWs.

Variable Marine Layer Clouds

Coastal low stratus clouds, also referred to by scientists as Marine Layer Clouds (MLC) or by locals in Southern California as “May gray” and “June gloom,” are a defining and highly variable aspect of coastal California summer climate. MLC in San Diego are common in late spring and early summer when cool moist air near the ocean surface and sinking warm air above cause a temperature inversion which traps low level moisture and creates optimal conditions for these blanketlike stratiform clouds. When present, MLC shield the coast from summertime heat and are an important weather pattern to the coastal ecosystems in San Diego (Jennings et al., 2018) and as important modulators of coastal expressions of summertime heat waves (Clemesha et al., 2018).

The stability of the lower atmosphere and ocean temperatures are important in the development of MLC, but there are additional drivers that interact on various spatial and temporal scales (Clemesha et al., 2016, 2017; Schwartz, 2015). Because global climate models are coarse-grid calculations and only poorly resolve the high gradient atmosphere-ocean structure along the California coast, and because the controls that govern the presence of coastal stratus are a balance of competing large and smaller scale processes, MLC appear to be poorly predicted. These factors and interactions need to be better understood to provide credible predictions of any future changes in MLC along San Diego County’s coastal zone under future climate change.

Sea-Level Rise, Coastal Storms, and Erosion

The coast is an important part of San Diego’s landscape, culture, and economy. It is also one of the more vulnerable landscapes in San Diego as many of its beaches, cliffs, and estuaries are already experiencing erosion and flooding, and these hazards are expected to accelerate in frequency and intensity with climate change.

Over the last century sea level has risen about 0.6 ft over much of the Central and Southern California coast. Global sea level provides an important indicator of the state of the warming climate, but regional sea-level rise varies across coastal communities because processes that cause sea-level rise interact differently and vary across coastal regions (Hamlington et al., 2020). Between 1980 and 2000, sea level along San Diego was relatively stable, even decreasing slightly as stronger wind stress gradients over the eastern Pacific suppressed the global rise along North America.

Since 2000, sea level has been increasing as the wind systems relaxed once again (Bromirski et al., 2011, 2012; Hamlington et al., 2016). For the San Diego region, sea-level rise models project similar ranges in elevated sea-levels until 2050 (approximately 0.6 to 1.3 feet). In the second half of the century, sea-level rise is expected to accelerate significantly, but there is greater uncertainty as to how extreme this rise will be at the end of the century (0.9 to 4 feet) with the possibility that it is much higher (Griggs et al., 2017). This is

related to unknown global greenhouse gas emission reductions and uncertainties about how rapid ocean warming will impact ice sheet melting (Griggs et al., 2017; Kalansky et al., 2018)

Given the increased rate of sea level rise, in the near term the greatest impacts from sea level rise are mostly likely to occur during events that combine high tides, El Nino and both locally and distantly generated wind-driven waves. For example, the generally elevated sea levels along the California coast during the super El Nino of 1982-83 were heightened by large winter storms and high waves during high tide periods, causing enormous coastal damage along the San Diego County shoreline (Flick, 1998).

The next period of unusually high tides will occur in 2021 from 16.8 and 4.4-year lunar tidal cycles, and will produce peak monthly tides about 0.5 ft higher than years in between cycle peaks (Cayan et al., 2008; Zetler & Flick, 1985). Hazardous coastal storm events are expected to become more severe as global sea level rises. San Diego's long history of coastal monitoring and research are now being used more to advance our understanding of how extreme events as repetitive stressors are increasing San Diego's coastal vulnerabilities. Recent improvements in coastal wave forecasting (Crosby et al., 2016, 2017) coupled with enhanced wave runup modeling are improving coastal flood forecasting capabilities for San Diego communities by defining the incident wave conditions and tide levels that result in site-specific flooding (Fiedler et al., 2018, 2020).

A long history of coastal monitoring and analysis by San Diego researchers (Ludka et al., 2019) has led to improved wave forecasts, improved understanding of sediment processes, including beach nourishment (addition of sand to the beaches) and cliff erosion, and improved understanding of local estuarine dynamics and ecosystems. Beach processes and sediment budgets are typically characterized within a particular littoral cell, a series of sand sources (such as rivers, streams, and eroding coastal bluffs) that provide sand to the shoreline, sand sinks (such as coastal dunes and submarine canyons) where sand is lost from the shoreline, and alongshore transport that moves sand along the shoreline.

Over the years, human activity, such as damming rivers, has limited the amount of sand that enters the littoral cell. For example, 60% (40% dammed and 20% urbanized and not dammed) of the Oceanside Littoral Cell watershed no longer generates beach sand (Young et al., 2010). Beach sand levels and waves have been monitored at selected San Diego beaches for as long as 17 years (Torrey Pines, Imperial Beach, Solana Beach, and Cardiff Beach) including two energetic El Nino winters that showed significant beach degradation (Ludka et al., 2019). These observations have led to a better understanding of seasonal beach sand level changes, areas of chronic erosion (Doria et al., 2016; Yates et al., 2009, 2011) and coastal impacts associated with El Niño events (Barnard et al., 2017; Doria et al., 2016; Ludka et al., 2015, 2016, 2018; Young, 2018).

Cliff erosion is a natural coastal process for much of northern San Diego County. In San Diego, between 1998 and 2009 the mean cliff top retreat was 0.46 ft/yr (Young, 2018). San Onofre State Beach is a cliff erosion hot spot in San Diego County due to extensive deep-seated landslide (Adam P Young, 2015). Other areas in north San Diego County, such as Encinitas and Del Mar, have also experienced a number of significant cliff failures in recent years. Researchers are advancing understanding of how wave-cliff impacts and rainfall contribute to both upper and lower coastal cliff erosion providing insight into how increasing sea levels, and storm driven waves and rainfall may further accelerate this erosion (Young et al., 2021)

Additionally, beach nourishment, or the addition of sand, is an important part of the sediment supply to beaches throughout the San Diego region, beginning at the end of World War II. SANDAG spent $44 million in 2001 and 2012 on non-opportunistic nourishment by placing 3.5 million cubic yards of sand on beaches throughout the County and north San Diego County has developed a 50-year, $160 million plan for beach nourishment (Diehl, 2015). The impacts of beach nourishment are complex as there are several physical processes that interact to determine the impacts on flooding, erosion, and ecosystems. Successive beach monitoring during the nourishments provides insight into how site-specific sediment transport processes, sand grain size, timing of the nourishment and the intensity and frequency of storm-driven wave energy can affect the success of a nourishment (Ludka et al., 2016, 2018, 2019).

Compounding Extreme Events

One concern, both historically and in the future is a sequence of hazards, or “compounding extreme events.” For example, the largest fire in California history, the Thomas Fire, and subsequent Montecito debris flows, unleashed from the barren landscape that was burned off by the Thomas Fire, is an example of a devastating sequence of climate related events. The December 2017 Thomas fire burned 281,893 acres occurred several months after a very wet winter (more than 22 inches November through May as an average over the South Coast Climate Division) and immediately following an extremely dry September through November that delivered only about 0.3 inches of precipitation.

When a strong Santa Ana wind event occurred in early December, the dry landscape provided the fuel for a devastating wildfire that was fanned by strong and back-to-back Santa Ana Wind events common in December. The conditions allowed the Thomas fire to grow to the largest wildfire in Southern California’s modern history. The first measurable rainfall occurred on January 8. During the storm, high intensity rainfall resulted in devastating post-fire debris flows in Montecito and Carpinteria resulting in 23 deaths, 246 structures destroyed, and 167 damaged. This sequence of devastating events has the potential to become more frequent given the projections of a drier fall, extending the annual seasonal drought into the main Santa Ana season, increasing the likelihood that a strong Santa Ana wind event occurs over a dry landscape that can provide fuel for the fire. Further extreme precipitation is projected to become more extreme, leading to the increased possibility of post-fire debris flows.

Other relevant compound co-occurring extremes for the San Diego area include public health impact form waves, wildfires, droughts, extreme precipitation, as well as coastal and inland flooding. A frequent compounder of wildfire and smoke impacts on public health (Aguilera et al. 2020, 2021a, 2021b) is the coastal heat that is often produced by Santa Ana winds (Gershunov et al. 2021), also known to impact health in the fall, winter, and spring (Schwarz et al. 2020). Another possible compounding event that could heighten the potential for increased frequency and severity of impacts in the future is the combination of a storm causing both terrestrial and coastal flooding. As sea level rises, and extreme precipitation becomes more extreme, the combination of coastal and storm water flooding has the potential to have devastating impacts on property, infrastructure, and water quality.



SECTION SIX: Develop a Mitigation Strategy

Decorative Image

Photo by
CAL FIRE San Diego Communications Bureau

San Diego County, California

2023

6. SECTION SIX: DEVELOP A MITIGATION STRATEGY

After each participating jurisdiction reviewed the Risk Assessment (Section 5), 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/priorities
3. An action plan/implementation strategy

The mitigation strategy serves as the long-term blueprint for reducing potential losses identified in the risk assessment. The mitigation strategy describes how the community will accomplish the overall purpose, or mission, of the planning process.

The mitigation strategy is made up of three main required components: mitigation goals, mitigation actions, and an action plan for implementation. These provide the framework to identify, prioritize, and implement actions to reduce risk to hazards.

Mitigation goals are general guidelines that explain what the community wants to achieve with the plan They are usually broad policy-type statements that are long-term, and they represent visions for reducing or avoiding losses from the identified hazards

Mitigation actions are specific projects and activities that help achieve the goals.

The action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the community's existing planning mechanisms. In a multi-jurisdictional plan, each jurisdiction must have an action plan specific to that jurisdiction and its vulnerabilities.

Although not required, some communities choose to develop **objectives** to help define or organize mitigation actions. Objectives are broader than specific actions, but are measurable, unlike goals. Objectives connect goals with the actual mitigation actions.

Each jurisdiction reviewed hazard profile and loss estimation information presented in Section 5 and used this as a basis for developing mitigation goals and objectives. 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.

6.1. MITIGATION ACTION EVALUATION

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, reviewed and incorporated 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 regarding 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 jurisdiction reviewed the actions detailed in the 2018 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 Section 7 of this Plan and jurisdiction-specific Annexes, if applicable. In all cases, the mitigation 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.

Also considered were cost-benefit reviews, changes in development, safe growth audits, mitigation efforts, mitigation potential improvement, and current/updated 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 is a tool used to assist communities in deciding which actions to include in their implementation strategy.

The table below shows the evaluation and prioritization of each mitigation action being considered by the Planning Team. For each action, evaluate the potential benefits and/or likelihood of successful implementation for the criteria defined below.

Rank each of the criteria with a -1, 0 or 1 using the following scale:

- 1 = Highly effective or feasible
- 0 = Neutral
- -1 = Ineffective or not feasible

STAPLEE Evaluation Criteria:

- **Life Safety** – How effective will the action be at protecting lives and preventing injuries?
- **Property Protection** – How significant will the action be at eliminating or reducing damage to structures and infrastructure?
- **Technical** – Is the mitigation action technically feasible? Is it a long-term solution? Eliminate actions that, from a technical standpoint, will not meet the goals.
- **Political** – Is there overall public support for the mitigation action? Is there the political will to support it?
- **Legal** – Does the community have the authority to implement the action?
- **Environmental** – What are the potential environmental impacts of the action? Will it comply with environmental regulations?
- **Social** – Will the proposed action adversely affect one segment of the population? Will the action disrupt established neighborhoods, break up voting districts, or cause the relocation of lower income people?
- **Administrative** – Does the community have the personnel and administrative capabilities to implement the action and maintain it or will outside help be necessary?
- **Local Champion** – Is there a strong advocate for the action or project among local departments and agencies that will support the action's implementation?
- **Other Community Objectives** – Does the action advance other community objectives, such as capital improvements, economic development, environmental quality, or open space preservation? Does it support the policies of the comprehensive plan?

Letters preceding Mitigation Action titles correspond with Section 6.2's "Prioritized Actions" sections.

TABLE 70: MITIGATION ACTIONS

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
Local Plans and Regulations											
D. Climate Change Planning	-	-	-	-	-	-	-	-	-	-	Not rated
G. Building Codes	-	-	-	-	-	-	-	-	-	-	Not rated
H. Hazard Mitigation Action Adoption	1	1	1	1	1	1	1	1	1	1	10
I. MSCP Open Space Acquisitions Efforts	1	1	1	1	1	1	1	1	1	1	10
K. Agricultural/Livestock Pass Program:	-	-	-	-	-	-	-	-	-	-	Not rated
L. Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters	-	-	-	-	-	-	-	-	-	-	Not rated
M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation	1	-	-	-	-	-	-	-	-	-	1
N. Regional Planning Efforts	-	-	-	-	-	-	-	-	-	-	Not rated

Mitigation Action	Life Safety	Property Protection	Technical	Political	Legal	Environmental	Social	Administrative	Local Champion	Other Community Objectives	Total Score
Structure and Infrastructure Projects											
A. Limit Development in Floodplains and Other Hazardous Areas	1	1	1	1	1	1	1	1	1	1	10
E. Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities:	-	-	-	-	-	-	-	-	-	-	Not rated
F. Community Rating System (CRS) Implementation and Improvement	-	-	-	-	-	-	-	-	-	-	Not rated
Natural Systems Protection											
B. Forest Management	1	1	1	1	1	1	1	1	1	1	10
C. Invasive and Noxious Weed Control (Vegetation Management)	-	-	-	-	-	-	-	-	-	-	Not rated
J. Wetland Protection and Restoration Efforts	1	1	1	1	1	1	1	1	1	1	10
Education and Awareness Programs											
M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation:	1	-	-	-	-	-	-	-	-	-	1
O. Training and Exercises	-	-	-	-	-	-	-	-	-	-	Not rated
P. Public Education and Outreach Programs:	-	-	-	-	-	-	-	-	-	-	Not rated
Q. Sustainable Department Goals	1	1	1	1	1	1	1	1	1	1	10
R. Three-Day Preparedness Kits	-	-	-	-	-	-	-	-	-	-	Not rated

S. San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program	-	-	-	-	-	-	-	-	-	-	Not rated
T. Free Residential Knox Box Program	-	-	-	-	-	-	-	-	-	-	Not rated
U. Free Wildland Urban Interface (WUI) Classes/Training for Communities	-	-	-	-	-	-	-	-	-	-	Not rated
V. The California Wildfire Mitigation Program - Home-Hardening Initiative	-	-	-	-	-	-	-	-	-	-	Not rated
W. Support Symposiums	-	-	-	-	-	-	-	-	-	-	Not rated

Mitigation Actions marked as "Not rated" in the table above are often considered existing County/Department priorities.

6.2. MITIGATION GOALS, OBJECTIVES, AND ACTIONS IMPLEMENTATION

This version of the Multi-Jurisdictional Hazard Mitigation Plan was revised over the past five years to reflect changes in development, progress in local mitigation efforts, and changes in priorities. Generally, hazard priorities remained unchanged, though some hazards' (such as Climate Change, Drought, and Extreme Heat) prevalence and/or probability of occurrence increased and, therefore, needed an updated Vulnerability Assessment.

All Hazard Profiles were researched for more modern content, data, and details.

This plan's Goals, Objectives, and Actions were updated from the last version to reflect current priorities within existing plans such as the County Strategic Plan/Initiatives and the County General Plan's Safety Element.

Local Mitigation Planning Groups (LMPGs) are comprised of individuals from various 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, objectives, and actions. Individual local planning group membership and decisions are discussed in each jurisdictions' annex.

There were four goals established by the County of San Diego's LMPG. They are listed in order of importance and do not differ significantly from 2018 goals. Instead, these updated goals reflect consolidated versions of 2018 repetitive sentences and were rewritten to use FEMA and existing County/Regional plans' terminology. Once developed, County staff

submitted the plan to Governor's Office of Emergency Services and FEMA for approval. Once approved, the Plan will be submitted to the Unified Disaster Council, then to the San Diego County Board of Supervisors for adoption.

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 further development of these goals and objectives, the LMPG compiled and reviewed current jurisdictional sources including the County's planning documents, codes, and ordinances. In addition, County representatives met with County OES to specifically discuss these hazard-related goals, objectives, and actions as they related to the plan.

For each goal, one or more objectives were 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. A mitigation action is a specific action, project, activity, or process taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals. The actions to reduce vulnerability to threats and hazards form the core of the plan and are a key outcome of the planning process.

Mitigation actions that will provide the most benefits in the least amount of time with available resources were selected as the highest priorities. This does not mean other actions are not considered important. It merely indicates that the LMPG set out to complete actions with current resources. The other actions will be completed as additional resources become available.

Below is a broad, general list of the County of San Diego's hazard-related Goals, Objectives, and Actions as prepared by the LMPG, and in conjunction with the Hazard Mitigation Planning Group (HMPG), locally elected officials, and the public.

The County of San Diego developed the broad list of Goals, Objectives, and Actions to assist in the implementation and achieving of the four identified hazard mitigation goals. For each Goal and Objective, specific Actions were developed that would foster implementation.

A smaller list of prioritized actions, and discussion of the prioritization and implementation of the action items is provided in Section 6.1. of this plan. That smaller list of Prioritized Actions will require progress reports during the next plan update.

"Grants and Local funds," "Potential Grant Funding," "Grants," "FEMA HMA Grants," and "State Grant Funding" named in the Base Plan and within the Annexes refers to FEMA funding available through the Hazard Mitigation Assistance (HMA) grant programs: the Hazard Mitigation Grant Program (HMGP); the Building Resilient Infrastructure and Communities (BRIC) Program; and the Flood Mitigation Assistance (FMA) Program.

GOAL 1	FOSTER SAFE, SUSTAINABLE, AND THRIVING ENVIRONMENTS.
Objective 1	*Promote hazard-resistant future developments and enhance operational resources.*
GOAL 2	REDUCE THE POSSIBILITY OF DAMAGES AND LOSSES TO EXISTING ASSETS (SUCH AS PEOPLE, CRITICAL FACILITIES/INFRASTRUCTURES, AND COUNTY-OWNED FACILITIES).
Objective 2	*Develop and/or enhance comprehensive all hazard mitigation policies, plans, technologies, and services.*
GOAL 3	ENHANCE LOCAL CAPACITY AND COMMITMENT TO BECOME LESS VULNERABLE TO ALL HAZARDS.
Objective 3	*Strengthen all hazard mitigation coordination and communication with local, state, tribal and federal governments/partners.*
GOAL 4	PROMOTE REGIONAL CULTURE OF HAZARD UNDERSTANDING, SUPPORT, AND PREPAREDNESS.
Objective 4	*Provide accessible and inclusive education, training, and resources to prepare the whole community for natural and human-caused hazards.*

The County of San Diego developed the following broad list of objectives and actions to assist in the implementation and achieving of the four identified hazard mitigation goals. For each objective, specific actions were developed that would foster implementation. A discussion of the prioritization and implementation of the action items is provided in Section 6.1.:

TABLE 71: HAZARD MITIGATION GOALS, OBJECTIVES, AND ACTIONS

Goal 1: Foster safe, sustainable, and thriving environments.	
Objective 1	**Promote hazard-resistant future developments and enhance operational resources.**
Action 1. A.	Facilitate the review, development, adoption, updating, and consistent enforcement of general plans, zoning ordinances and building codes by: • Strengthening existing development regulations to discourage land uses and activities that create or worsen hazards • planning and zoning for open space, recreational agricultural or other low intensity uses within floodway fringes • reviewing and revising, as necessary, sediment and erosion control regulations • ensuring newly constructed and existing critical facilities are designed to function after a major earthquake • updating building codes to reflect current earthquake standards • updating the County Consolidated Fire Code as necessary • updating the General Plan and zoning regulations to reflect hazardous areas using development patterns that should respect environmental characteristics and are harmonious with existing topography • developing model Weed Abatement and Fuel Modification ordinances • continuing to protect and restore wetlands by revising development ordinances, incorporating, and maintaining valuable wetlands in open space preservation programs to mitigate effects of development on wetland areas • staffing enforcement personnel to ensure compliance • supporting coordinated permitting activities processes through developing and coordinating permits for all agencies, developing notification procedures for all permits that support affected agencies, continuing to streamline policies to eliminate conflicts and duplication of efforts and continuing to exchange resources and work with local/regional partners • continuing to utilize multi-agency permitting and enforcement team • continuing to enforce trespassing regulations in high-risk areas • continuing forest and open space management efforts
Action 1. B.	Protect existing assets and limit future development in hazardous areas by: • continuing to identify high hazard areas, identify hazard-prone structures/assets, inventory wildlife vegetative communities by type and vegetation age class, and develop/update data sets necessary to test hazard scenarios and mitigation tools using GIS (Geographic Information Systems) • managing wildland vegetative communities to promote less hazardous conditions through defining target class ranges, developing partnerships within communities to fix age class ranges, and promoting cooperative vegetation management programs that incorporate hazard mitigation • continuing to construct barriers around hazard-prone structures • continuing to assess countywide utility infrastructures with regard to earthquake risk • continuing to review and compare existing flood control standards, zoning and building requirements • acquiring properties, when feasible, on floodway to prevent development • encouraging and conducting structural retrofitting to strengthen resistance to damage • encouraging clustering • continuing to gain public acceptance for avoidance policies in high-hazard areas • adopting policies that discourage growth in flood-prone areas • assuring adequate funding to restore damaged facilities to 100-year flood design

	• updating storm water system plans and improving storm water facilities in high-risk areas • limiting development in areas of known geologic hazards • creating demand for hazard-resistant construction and site planning • increasing public understanding, support, and demand for new developments' hazard mitigation • supporting transfer of development rights in hazard-prone areas. To protect lives and property, development in floodplains shall be appropriate and limited, and high fire hazard areas shall have adequate access for emergency vehicles.
Responsible Department(s)	• Fire • Land Use & Environment Group • Department of Public Works • Planning & Development Services • Parks & Recreation • Office of Emergency Services • Department of Agriculture, Weights & Measures
Prioritized Actions	A. Limit Development in Floodplains and Other Hazardous Areas: County Department of Public Works will continue to limit development of park structures and facilities in floodplains and other hazardous areas. B. Forest Management: County Parks & Recreation will continue to conduct brush and vegetation management in preserves to reduce fire and flooding risks. C. Invasive and Noxious Weed Control (Vegetation Management): The County Department of Agriculture, Weights & Measures will continue to promote cooperative vegetation management programs that promote hazard mitigation will be critical in continue to mitigate wildfire risks from vegetation. D. Climate Change Planning: The County Department of Public Works' Flood Control District will lead efforts related to downscale modeling, stress testing Flood Control facilities during higher flows, updating County Special Drainage Area (SDA) Master Plans, update of County Hydrology Manual and Hydraulic Design Manual to account for climate change impacts. E. Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities: The County Department of Public Works' Flood Control District will lead these efforts. F. Community Rating System (CRS) Implementation and Improvement: The County Department of Public Works' Flood Control District will lead these efforts. G. Building Codes: County Planning & Development Services (PDS: Building Division) will review building codes to reflect current earthquake, fire, and wind standards annually and adopt as necessary to ensure structures are built to withstand hazard events. County staff will attend conferences and industry meetings to better understand changes to codes and after-event support efforts. H. Hazard Mitigation Action Adoption: County Planning & Development Services (PDS), County Fire, County Technology Office (CTO), County Communications Office (CCO) and County Office of Emergency Services (OES) will publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region. I. MSCP Open Space Acquisitions Efforts: County Department of Parks & Recreation will continue open space acquisition efforts, such as purchasing land that could be preserved/protect natural resources and undeveloped land in high hazard areas. J. Wetland Protection and Restoration Efforts: The County Department of Parks & Recreation will continue wetland protection and restoration efforts. K. Agricultural/Livestock Pass Program: The County Department of Agriculture, Weights & Measures will help the County of San Diego establish a county-based program that grants agriculturalists special access to their farms or ranches during disaster.

Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 – January 2028

Goal 2: Reduce the possibility of damages and losses to existing assets (such as people, critical facilities/infrastructures and County-owned facilities).	
Objective 2	**Develop and/or enhance comprehensive all hazard mitigation policies, plans, technologies, and services.**
Action 2.A.	Protect existing assets with the highest relative vulnerability to hazard effects by: • protecting vulnerable populations from the effects of hazards • identifying projects related to all hazards for pre-disaster mitigation funding • including safety considerations in the planning and decision-making process by establishing policies related to future development that will minimize the risk of personal injury, loss of life, property damage, and environmental damage associated with natural and human-caused hazards.

Action 2.B.	Create, update and/or improve existing hazard/hazard mitigation policies, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), plans, projects, technologies, and services with partners related, but not limited, to:
	• Avalanche
	• Dam Failure
	  ○ by updating dam inundation plans every ten years, at minimum
	  ○ by coordinating with partners and supporting existing efforts to mitigate dam failures (e.g., U.S. Army Corps of Engineers, U.S. Bureau of Reclamation and California Department of Water Resources)
	• Drought
	  ○ by encouraging the public to adopt drought tolerant landscaping or xeriscape practices
	  ○ by promoting use of reclaimed water for all landscaping efforts, where available and feasible.
	  ○ support groundwater recycling efforts
	• Earthquake
	  ○ by continuing to study ground motion, landslide ad liquefaction
	  ○ by continuing to implement an ongoing seismic risk assessment program
	  ○ by developing and implementing an incentive program for seismic retrofits
	  ○ by studying ground motion, landslide and liquefaction
	• Erosion
	  ○ by continuing to coordinate with coastal cities to develop comprehensive plans
	• Expansive Soils
	• Extreme Cold
	• Extreme Heat
	  ○ by supporting regional efforts to prepare for excessive heat events, participating in “Excessive Heat Emergency Awareness” events and exercising heat emergency plans as established by the County Health & Human Services Agency (HHSA), Aging & Independence Services (AIS), Emergency Medical Services (EMS) and Public Health Services (PHS)
	  ○ by continuing to provide “Cool Zones” during excessive heat events
	• Flood
	  ○ by developing a flood control strategy that ensures coordination with local, state, and federal agencies/partners
	  ○ by minimize repetitive losses caused by flooding
	  ○ by increasing participation and improving compliance with the National Flood Insurance Program (NFIP)

	• Hail
	• Hurricane
	• Landslide
	  ○ by studying and improving storm drains for landslide-prone areas
	• Lightning
	• Sea Level Rise
	• Severe Wind
	• Severe Winter Weather
	• Subsidence
	• Tornado
	• Tsunami
	  ○ coordinate with coastal cities to develop comprehensive plans
	• Wildfire/Structure Fire
	  ○ by coordinating and supporting existing and new efforts to mitigate structural and vegetation fires
	  ○ by continuing to develop partnerships for a countywide vegetation management program
	  ○ by enforcing Defensible Space Clearance distances
	  ○ by working with community-based groups to pilot chipping programs
	  ○ by continuing to research options to provide low-cost insurance to cover landowners who allow prescribed burning on their lands
	  ○ by establishing and continuing wildland fire technical working group
	  ○ by continuing to develop partnerships for a countywide vegetation management program
	  ○ by reporting annually to the Board of Supervisors on the progress of fire mitigation strategies
	• Climate Change
	  ○ by raising awareness of the climate change links to public health
	  ○ by reducing the public health impacts of climate change
	  ○ by mitigating potential hazards caused by climate related events
	• Terrorism / Cyber Terrorism
	  ○ Attachment A contains Terrorism/Cyber Terrorism Goals, Objectives, and Actions, is categorized as For Official Use Only, and is only available to official partners.
	• Chemical, Biological, Radiological, Nuclear, Explosion (CBRNE) Threats
	  ○ Attachment A contains Chemical, Biological, Radiological, Nuclear, Explosion (CBRNE) threats' goals, objectives, and actions, is categorized as For Official Use Only, and is only available to official partners.
	• Pandemic Disease

Responsible Department(s)	• Sheriff's Department • Fire • Public Safety Group • Office of Emergency Services • Department of Public Works • Planning & Development Services • Land Use and Environmental Group/GIS • Health & Human Services Agency • Emergency Medical Services • Public Health Preparedness & Response • Public Health Services • Department of Environmental Health & Quality/ Hazardous Incident Response Team
Prioritized Actions	L. Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters, and Safety Element (of the County

	General Plan): The County Office of Emergency Services (OES) will work with the eighteen incorporated cities and participating county departments, special districts and partners to revise, update and complete these plans, projects, technologies and services annually and/or as needed. M. Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation: The County of San Diego, Public Health Services and the Health & Human Services Agency are undertaking initiatives over the next several years to raise awareness around excessive heat and climate change.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Goal 3: Enhance local capacity and commitment to become less vulnerable to all hazards.	
Objective 3	**Strengthen all hazard mitigation coordination and communication with local, state, tribal and federal governments/partners.**
Action 3.A.	Increase awareness and knowledge of hazard mitigation principles and practice among partners by: • continuously demonstrating the importance of pre-disaster mitigation planning to the Board of Supervisors and other public officials • conducting meetings with key elected officials to determine local issues and concerns • leveraging the County Communications Office/County News Center and the Partner Relay to promote mitigation actions
Action 3.B.	Encourage other partners/organizations to incorporate hazard mitigation activities by: • continuing to streamline policies to eliminate conflicts and duplication of efforts • continuing to encourage tribal governments to become part of the Hazardous Incident Response Team (HIRT) Joint Powers Agreement (JPA).
Action 3.C.	Establish, maintain, and improve close and lasting working relationships with partners by: • supporting the County Fire Safe Council • continuing and maintaining multi-jurisdictional/multi-functional training and exercises to enhance hazard mitigation • leveraging resources and expertise that will further hazard mitigation efforts • inviting/encouraging participation of tribal governments and special districts in Multi-Jurisdictional Hazard Mitigation Plan updates.
Action 3.D.	Improve the County's capability and efficiency at administering pre- and post-disaster mitigation by: • collaborating with partners to identify, prioritize and implement mitigation actions • continuing to establish a requirement that all hazard mitigation projects submitted to the State must be reviewed by the County • continuing to improve coordination with the State Hazard Mitigation Department about local issues • maintaining consistency with the State in administering recovery programs

	• coordinating recovery activities while restoring and maintaining public services through maintenance of two damage assessment teams and their activation/reporting procedures.
Responsible Department(s)	• Fire • Office of Emergency Services • Public Safety Group • Department of Environmental Health & Quality/Hazardous Incident Response Team
Prioritized Actions	N. Regional Planning Efforts: The County Office of Emergency Services (OES) and participating County departments will streamline policies to eliminate conflicts and duplication of efforts in regional planning efforts (i.e. Hazard Mitigation Plan updates, etc.) by coordinating emergency management activities with regional stakeholders and facilitating meetings on a regular basis with regional emergency managers/the eighteen incorporated cities, healthcare agencies, campus emergency managers, Department of Defense (DOD)/local military partners, Voluntary Organizations Active in Disaster (VOAD) and faith-based partners. O. Training and Exercises: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and private sector agencies to maintain multi-jurisdictional/multi-functional training and annual exercises.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Goal 4: Promote regional culture of hazard understanding, support, and preparedness.	
Objective 4	**Provide accessible and inclusive education, training, and resources to prepare the whole community for natural and human-caused hazards.**
Action 4.A.	Improve the County's ability to manage pre- and post-disaster scenarios and respond effectively during an event by: • attracting, recruiting, and retaining qualified, professional, and experienced staff • training staff for appropriate positions/assignments within the Operational Area Emergency Operations Center (OA EOC).
Action 4.B.	Increase and improve public education and awareness of hazards and mitigation action opportunities using a whole community approach by: • continuing to identify hazard-specific issues and needs and identifying communities that have recurring losses • publicizing and encouraging the adoption of appropriate hazard mitigation actions • providing hazard information on County websites and leveraging the County Communications Office/County News Center • continuing to encourage the public to prepare and maintain a three-day preparedness kit for home and work • promoting the County's "Know Your Hazards" and "SD Emergency" applications. • coordinating production of brochures, informational packets, and other handouts • delivering presentations as requested/needed • implementing hazard awareness program

	• improving hazard warnings and response planning • implementing public education program to address fire dangers and corrective measures • continuing to develop, plan and publish evacuation procedures to the public • continuing to participate in community awareness meetings • continuing to collaborate with local, state and federal agencies' on mapping efforts • continuing to support public and private sector symposiums • developing and maintaining hazard mitigation partnerships with the media.
Action 4.C.	Monitor and publicize the effectiveness of hazard mitigation actions implemented countywide by: • continuing to use County websites to publicize mitigation actions • continuing to establish budgets and identifying funding resources for mitigation outreach • continuing to determine mitigation messages to convey and create marketing campaigns • continuing to develop and distribute hazard brochures, CDs and other publications.
Action 4.D.	Promote hazard mitigation in the business community by: • increasing knowledge and awareness of hazard mitigation principles and practices • encouraging and empowering businesses to identify and address hazard-specific issues and needs • encouraging businesses to develop and implement hazard mitigation actions.
Responsible Department(s)	• Office of Emergency Services • Public Safety Group • Fire
Prioritized Actions	P. Public Education and Outreach Programs: The County Office of Emergency Services (OES) and County Communication Office (CCO) will develop and maintain hazard mitigation-related public education and outreach programs (i.e. annual defensible space education/outreach, terrorism prevention, erosion control, etc.) Q. Sustainable Department Goals: The County Office of Emergency Services (OES) will continue to research ways to sustainably retain a trained workforce, particularly related to Emergency Operations Center positions. County OES will also continue to research economically sustainable efforts, technologies, equipment, vehicles, and other necessities to reduce the department's carbon footprint. R. Three-Day Preparedness Kits: The County Office of Emergency Services (OES), County Communications Office (CCO), and the County Technology Office (CTO) will encourage the public to prepare and maintain a three-day preparedness kit for home and work through outreach events, social media, paid media and earned media. S. San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program: Utilize County Fire's Community Emergency Response Team (trained and background checked volunteers) to conduct in-person outreach training, events and activities bringing emergency preparedness information to underserved populations in their rural communities. T. Free Residential Knox Box Program: County Fire will integrate the Knox Box Program through outreach efforts with CAL FIRE, participating County departments, Fire Safe Council of San Diego County, and other various stakeholders. U. Free Wildland Urban Interface (WUI) Classes/Training for Communities: County Fire can integrate with partner agencies to offer the WUI course throughout San

	Diego County. Participating agencies could include CAL FIRE, Bureau of Land Management, US Forest Service, and local Fire Safe Councils. V. The California Wildfire Mitigation Program - Home-Hardening Initiative: County Fire is currently working with the California Governor's Office of Emergency Services to pilot the California Wildfire Mitigation Program (CWMP) Home-Hardening Initiative. The CWMP Home Hardening Initiative aims to perform defensible space and retrofit measures on existing residential homesites to mitigate against wildfire losses. This program targets high social-vulnerability communities and provides financial assistance to qualifying low-and moderate-income (LMI) households. This pilot program will be implemented in three high-risk areas within San Diego County: Dulzura, Potrero, and Campo. W. Support Symposiums: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and the private sector to support public and private sector hazard mitigation planning symposiums.
Potential Funding Source(s)	General Fund, federal and/or state grants
Timeline	January 2023 - January 2028

Once the comprehensive list of jurisdictional goals, objectives, and action items listed above was developed, the proposed mitigation actions were prioritized using FEMA's 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 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 23 Prioritized Actions, as well as an implementation strategy for each (i.e., will need a progress report during the next plan update cycle, according to current FEMA requirements), are:

A. **Prioritized Action:** Limit Development in Floodplains and Other Hazardous Areas: County Department of Public Works will continue to limit development of park structures and facilities in floodplains and other hazardous areas.
   - **Coordinating Individual/Department:** County Department of Public Works
   - **Potential Funding Source:** Flood Control District Fund, General Fund, grants
   - **Implementation Timeline:** Current- 2028
   - **Hazard(s) Addressed:** Flood

B. **Prioritized Action:** Forest Management: County Parks & Recreation will continue to conduct brush and vegetation management in preserves to reduce fire and flooding risks.
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund and grants
   - **Implementation Timeline:** Current- 2028

- **Hazard(s) Addressed:** Wildfire/Structure Fire, Flood

C. **Prioritized Action:** Invasive and Noxious Weed Control (Vegetation Management): The County Department of Agriculture, Weights & Measures will continue to promote cooperative vegetation management programs that promote hazard mitigation will be critical in continue to mitigate wildfire risks from vegetation.
   - **Coordinating Individual/Department:** County Department of Agriculture, Weights & Measures
   - **Potential Funding Source:** Current cost is funded with California Department of Food and Agriculture invasive weed grants, and internal agreements with DPR and DPW
   - **Implementation Timeline:** Current- 2028
   - **Hazard(s) Addressed:** Wildfire/Structure Fire, Flood

D. **Prioritized Action:** Climate Change Planning: The County Department of Public Works' Flood Control District will lead efforts related to downscale modeling, stress testing Flood Control facilities during higher flows, updating County Special Drainage Area (SDA) Master Plans, update of County Hydrology Manual and Hydraulic Design Manual to account for climate change impacts.
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** Climate Change, Flood, Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion

E. **Prioritized Action:** Expansion of Automatic Local Evaluation in Real-Time (ALERT) to Vulnerable and Underserved Communities: The County Department of Public Works' Flood Control District will lead these efforts.
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** Flood, Dam Failure

F. **Prioritized Action:** Community Rating System (CRS) Implementation and Improvement: The County Department of Public Works' Flood Control District will lead these efforts.
   - **Coordinating Individual/Department:** County Department of Public Works' Flood Control District
   - **Potential Funding Source:** Grants and local funds
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** Flood

G. **Prioritized Action:** Building Codes: County Planning & Development Services (PDS: Building Division) will review building codes to reflect current earthquake, fire, and wind standards annually and adopt as necessary to ensure structures are built to withstand hazard events. County staff will attend conferences and industry meetings to better understand changes to codes and after-event support efforts.

- **Coordinating Individual/Department:** County Planning & Development Services (Building Division)
- **Potential Funding Source:** Unknown, potential future grants
- **Implementation Timeline:** Annually
- **Hazard(s) Addressed:** Wildfire/Structure Fire, Flood, Earthquake/Liquefaction

H. **Prioritized Action:** Hazard Mitigation Action Adoption: County Planning & Development Services (PDS), County Fire, County Technology Office (CTO), County Communications Office (CCO) and County Office of Emergency Services (OES) will publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region.
   - **Coordinating Individual/Department:** County Planning & Development Services (PDS), County Fire, County Technology Office (CTO), County Communications Office (CCO) and County Office of Emergency Services (OES)
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

I. **Prioritized Action:** MSCP Open Space Acquisitions Efforts: County Department of Parks & Recreation will continue open space acquisition efforts, such as purchasing land that could be preserved/protect natural resources and undeveloped land in high hazard areas.
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund, grants, endowments, etc**.**
   - **Implementation Timeline:** Each Fiscal Year
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

J. **Prioritized Action:** Wetland Protection and Restoration Efforts: The County Department of Parks & Recreation will continue wetland protection and restoration efforts.
   - **Coordinating Individual/Department:** County Department of Parks & Recreation
   - **Potential Funding Source:** General Fund and grants
   - **Implementation Timeline:** Current-2028
   - **Hazard(s) Addressed:** Climate Change, Drought, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Tsunami

K. **Prioritized Action:** Agricultural/Livestock Pass Program: The County Department of Agriculture, Weights & Measures will help the County of San Diego establish a county-based program that grants agriculturalists special access to their farms or ranches during disaster.
   - **Coordinating Individual/Department:** County Department of Agriculture, Weights & Measures
   - **Potential Funding Source:** General Fund, Potential future grants

- **Implementation Timeline:** Feasibility Analysis 3/2022-6/2022, Program Development 7/2022-12/2022, and Program Implementation 1/2023
- **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

L. **Prioritized Action:** Operational Area Emergency Operations Plan (OA EOP)/Associated Annexes, Regional Emergency Plans, Concept of Operations (ConOps), Standard Operating Procedures (SOPs), Emergency Operations Center (EOC) Planning/Training, Work Plans and Charters, and Safety Element (of the County General Plan): The County Office of Emergency Services (OES) will work with the eighteen incorporated cities and participating county departments, special districts and partners to revise, update and complete these plans, projects, technologies and services annually and/or as needed.
   - **Coordinating Individual/Department:** County Office of Emergency Services and Planning & Development Services (for the Safety Element of the County General Plan)
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Severe Winter Weather, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

M. **Prioritized Action:** Excessive Heat Awareness Promotion, Resilience, Adaptation and Mitigation: The County of San Diego, Public Health Services and the Health & Human Services Agency are undertaking initiatives over the next several years to raise awareness around excessive heat and climate change.
   - **Coordinating Individual/Department:** County of San Diego, Public Health Services, and the Health & Human Services Agency
   - **Potential Funding Source:** To be determined
   - **Implementation Timeline:** 2-5 years based on timeline for implementation
   - **Hazard(s) Addressed:** Climate Change, Extreme Heat, Drought

N. **Prioritized Action:** Regional Planning Efforts: The County Office of Emergency Services (OES) and participating County departments will streamline policies to eliminate conflicts and duplication of efforts in regional planning efforts (i.e. Hazard Mitigation Plan updates, etc.) by coordinating emergency management activities with regional stakeholders and facilitating meetings on a regular basis with regional emergency managers/the eighteen incorporated cities, healthcare agencies, campus emergency managers, Department of Defense (DOD)/local military partners, Voluntary Organizations Active in Disaster (VOAD) and faith-based partners.
   - **Coordinating Individual/Department:** County Office of Emergency Services and participating County departments
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028

- **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

O. **Prioritized Action:** Training and Exercises: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and private sector agencies to maintain multi-jurisdictional/multi-functional training and annual exercises.
   - **Coordinating Individual/Department:** The County Office of Emergency Services and participating county departments
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

P. **Prioritized Action:** Public Education and Outreach Programs: The County Office of Emergency Services (OES) and County Communication Office (CCO) will develop and maintain hazard mitigation-related public education and outreach programs (i.e. annual defensible space education/outreach, terrorism prevention, erosion control, etc.)
   - **Coordinating Individual/Department:** County Office of Emergency Services and County Communication Office
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

Q. **Prioritized Action:** Sustainable Department Goals: The County Office of Emergency Services (OES) will continue to research ways to sustainably retain a trained workforce, particularly related to Emergency Operations Center positions. County OES will also continue to research economically sustainable efforts, technologies, equipment, vehicles, and other necessities to reduce the department's carbon footprint.
   - **Coordinating Individual/Department:** County Office of Emergency Services
   - **Potential Funding Source:** General fund as grants as available
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

R. **Prioritized Action:** Three-Day Preparedness Kits: The County Office of Emergency Services (OES), County Communications Office (CCO), and the County Technology Office

(CTO) will encourage the public to prepare and maintain a three-day preparedness kit for home and work through outreach events, social media, paid media and earned media.

- **Coordinating Individual/Department:** County Office of Emergency Services, County Communications Office, and the County Technology Office
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028
- **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

S. **Prioritized Action:** San Diego County Fire Community Emergency Response Team's Community Emergency Preparedness Outreach Program: Utilize County Fire's Community Emergency Response Team (trained and background checked volunteers) to conduct in-person outreach training, events and activities bringing emergency preparedness information to underserved populations in their rural communities.

- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** Grant funds available to Community Emergency Response Teams through San Diego Gas and Electric, the Governor's California Office of Emergency Services and other one-time grant opportunities.
- **Implementation Timeline:** 2023-2028 and annual Community Emergency Preparedness Outreach.
- **Hazard Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

T. **Prioritized Action:** Free Residential Knox Box Program: County Fire will integrate the Knox Box Program through outreach efforts with CAL FIRE, participating County departments, Fire Safe Council of San Diego County, and other various stakeholders.

- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028
- **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

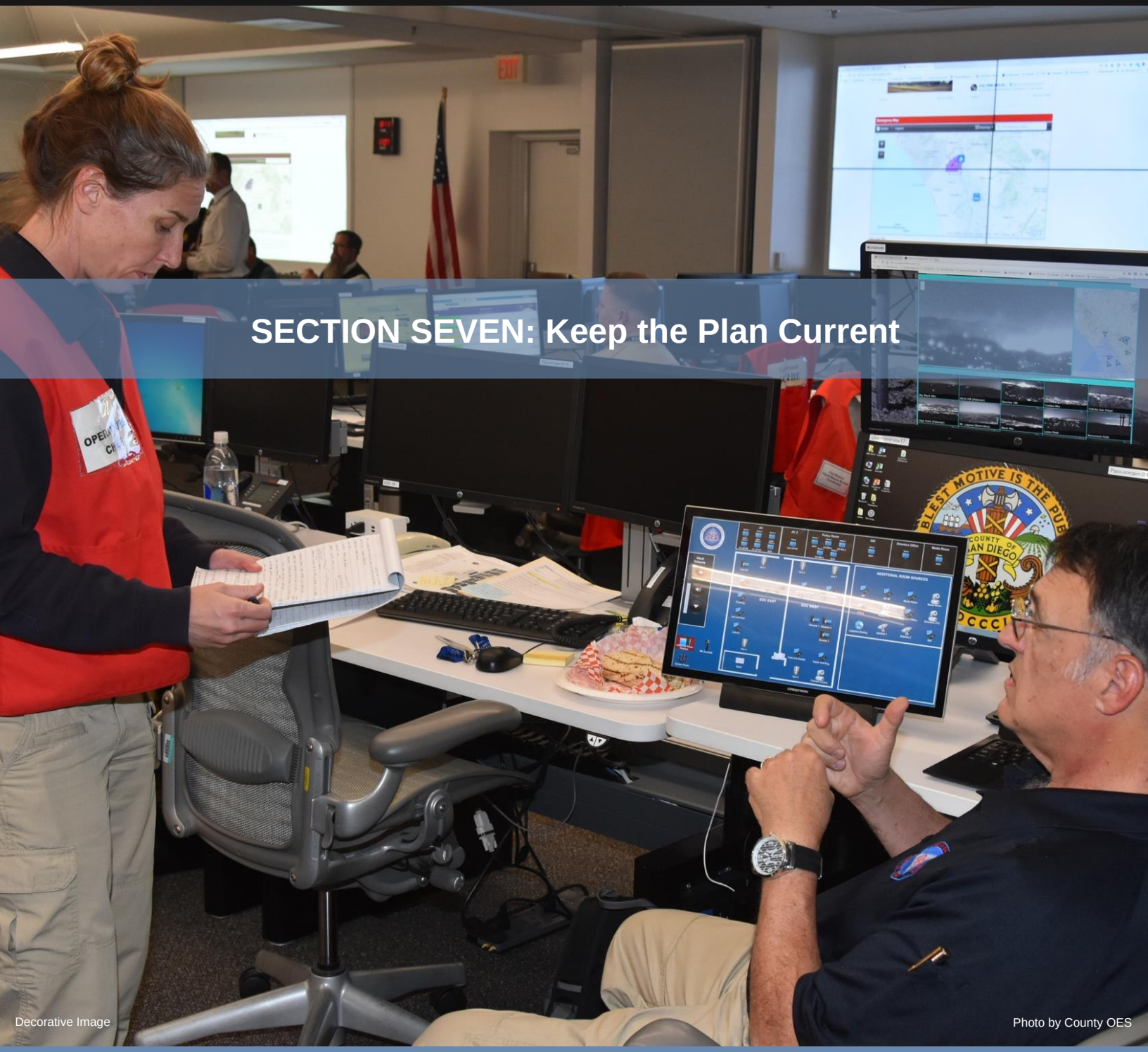
U. **Prioritized Action:** Free Wildland Urban Interface (WUI) Classes/Training for Communities: County Fire can integrate with partner agencies to offer the WUI course throughout San Diego County. Participating agencies could include CAL FIRE, Bureau of Land Management, US Forest Service, and local Fire Safe Councils.

- **Coordinating Individual/Department:** County Fire
- **Potential Funding Source:** General Fund, federal and/or state grants
- **Implementation Timeline:** 2023-2028
- **Hazard(s) Addressed:** Wildfire/Structure Fire

V. **Prioritized Action:** The California Wildfire Mitigation Program - Home-Hardening Initiative: County Fire is currently working with the California Governor's Office of Emergency Services to pilot the California Wildfire Mitigation Program (CWMP) Home-Hardening Initiative. The CWMP Home Hardening Initiative aims to perform defensible space and retrofit measures on existing residential homesites to mitigate against wildfire losses. This program targets high social-vulnerability communities and provides financial assistance to qualifying low-and moderate-income (LMI) households. This pilot program will be implemented in three high-risk areas within San Diego County: Dulzura, Potrero, and Campo.
   - **Coordinating Individual/Department:** County Fire
   - **Potential Funding Source:** Federal and state grants
   - **Implementation Timeline:** 3-year program (2022-2025); potentially longer subject to the availability of additional funding.
   - **Hazard(s) Addressed:** Wildfire/Structure Fire

W. **Prioritized Action:** Support Symposiums: The County Office of Emergency Services (OES) and participating county departments will collaborate with the eighteen incorporated cities and the private sector to support public and private sector hazard mitigation planning symposiums.
   - **Coordinating Individual/Department:** The County Office of Emergency Services
   - **Potential Funding Source:** General Fund, federal and/or state grants
   - **Implementation Timeline:** 2023-2028
   - **Hazard(s) Addressed:** All Hazards including, but not limited to, Climate Change, Dam Failure, Drought, Earthquake/Liquefaction, Extreme Heat, Flood, Human-Caused Hazards (Terrorism & Hazardous Materials Incidents (CBRNE threats)), Rain-Induced Landslide, Sea Level Rise/Coastal Storms/Erosion, Tsunami, Wildfire/Structure Fire

See respective annexes for other jurisdictions'/planning participants' hazard mitigation Goals, Objectives, Actions/Prioritized Actions, and implementation strategies.



SECTION SEVEN: Keep the Plan Current

Decorative Image

Photo by County OES

San Diego County, California

2023

7. SECTION SEVEN: KEEP THE PLAN CURRENT

Hazard Mitigation Plan updates provide the opportunity to consider how well the procedures established in the previously approved plan worked and revise them as needed. This plan was last updated in 2018.

This section of the 2023 Plan describes the formal process that will ensure 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 jurisdiction will integrate public participation throughout the plan maintenance process.

7.1. MITIGATION ACTION PROGRESS

This version of the Multi-Jurisdictional Hazard Mitigation Plan was revised over the past five years to reflect changes in development, progress in local mitigation efforts, and changes in priorities. Generally, hazard priorities remained unchanged, though some hazards' (such as Climate Change, Drought, and Extreme Heat) prevalence and/or probability of occurrence increased and, therefore, needed an updated Vulnerability Assessment.

All Hazard Profiles were researched for more modern content, data, and details.

This plan's Goals, Objectives, and Actions were updated from the last version to reflect current priorities within existing plans such as the County Strategic Plan/Initiatives and the County General Plan's Safety Element.

The 2020 COVID-19 Pandemic negatively affected overall progress on the 2018 plan and actions' progress, but did not negatively impact the community's vulnerability because the plan was created in tandem with existing local plans/procedures and thus aided in local government responses and actions to keep communities and assets safe.

Below are progress reports for the eleven priority mitigation actions listed in the 2018 Plan:

1. **Action/Project Title:** Update Operational Area Emergency Operational Plan (OA EOP) and associated Annexes

   Progress Report Period: January 2019 to January 2020

   Responsible Agency: The County Office of Emergency Services (County OES) worked with the 18 incorporated cities and participating special districts to revise and update the OA EOP/Annexes.

   Project Status: Project delayed

   Explain: Project was delayed due to COVID-19 Pandemic needs/priorities and OES staff/Project Manager turnover.

   Summary: During the reporting period, the previous County OES project manager(s) conducted meetings to discuss the OA EOP Basic Plan and annex revision suggestions/updates with county departments and partners from the eighteen incorporated cities and special districts. The project is a priority for County OES, but is a large project requiring many staff hours, and collaboration is contingent on the availability of participating project partners.

This project was managed, at minimum, by three different County OES staff members who left the department, so staff turnover caused deadline obstacles and time delays. Furthermore, County OES was initially responsible for coordinating response and resources for the COVID-19 Pandemic once County OES' Emergency Operations Center was activated. Therefore, this project, and many others, could no longer be considered a departmental priority, as County OES instead needed to focus on ensuring the safety and well-being of San Diego County community members.

This project is still considered relevant, and revision/update is ongoing. The mention of this project within the updated Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) will be revised to reflect elements eligible for hazard mitigation grant funding, such as (but not limited to), incorporation of passed legislation, cohesive integration with the MJHMP and other existing county/department plans, Emergency Operations Center training, equipment, etc. This project is estimated to be complete by June 30, 2022.

2. **Action/Project Title:** Develop and maintain public education and outreach programs related to actions community members can take to mitigate hazards they may face. (Annual defensible space education/outreach; terrorism prevention; erosion control, etc.)

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES) and County Communications Office (CCO)

   Project Status: Completed and Ongoing (but delayed)

   Explain: Action/Project has been completed and is also an ongoing effort/action. Project delayed because priorities shifted due to COVID-19 pandemic. There were also staffing changes.

   Summary: There have been staffing changes which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include developing and posting protective actions community members can take to prepare themselves for emergencies and natural disasters from 2018 and thereon on County OES social media platforms in English and in Spanish, the dissemination of the updated Personal Disaster Plans translated into 12 languages, printing of flyers AlertSanDiego, and the SD Emergency app disseminating these flyers at community events and presentations.

   Community members have been encouraged to take appropriate hazard mitigation actions through alert and warning postings and press releases posted to the Ready San Diego website, AlertSanDiego, the SD Emergency app, County News Center articles. Campaigns were also conducted to increase the number of community members registered for AlertSanDiego Lyft (2018). Hazard mitigation messages have been developed, written, and promoted through television interviews in English and Spanish. These messages have also been provided to the Partner Relay network (a group with over 700 individuals) which is made of trusted community organizations who serve San Diego's diverse, underserved communities, as well as community members with limited English proficiency through emails and trainings provided to the organizations. They can share these messages with the clients they serve. Numerous of these messages have also been translated into Spanish. The goal is to continue these efforts for the next few months leading through 2023.

The project is typically a priority for County OES, but is a large project requiring many staff hours, and collaboration is contingent on the outreach resources, implemented contracts, translation staff/resources, and funding. This project was managed, at minimum, by two different County OES staff members. One staff member left the department, so staff turnover caused deadline obstacles and time delays.

Furthermore, County OES was initially responsible for coordinating response and resources for the COVID-19 Pandemic once County OES' Emergency Operations Center was activated. Therefore, this project, and many others, could no longer be considered a departmental priority, as County OES instead needed to focus on ensuring the safety and well-being of San Diego County community members.

Public education, information, outreach and community engagement efforts will continue through January 2023 and include attending presentations on preparedness, supporting staff with documentation and writing of internal documents, materials design & inventory, communications, review of current and past communications messages, draft updated templates with preparedness/hazard mitigation messages, post preparedness messages on social media platforms, preparedness interviews on television, create a Partner Relay capacity plan, Partner Relay Content Creation, Partner Relay train EOC liaisons, conduct countywide preparedness survey, outreach campaigns including on AlertSanDiego, SD Emergency app, and translations of documents from English to Spanish.

3. **Action/Project Title:** Review the County Consolidated Fire Code annually and update as necessary

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Planning & Development Services and County Fire

   Project Status: Completed

   Summary: The County of San Diego Consolidated Fire Code has been updated twice during the reporting period, with the most recent update taking place in March 2020. This is an ongoing project that is still relevant for inclusion in the San Diego County Hazard Mitigation Plan. San Diego County Fire, in coordination with the County Planning & Development Services Department, will continue reviewing the Consolidated Fire Code on an annual basis and will make updates to the code as needed, or at minimum, will update it once every three years.

4. **Action/Project Title:** 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.

   Progress Report Period: January 2019 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, local military, healthcare agencies and the 18 incorporated cities

   Project Status: Ongoing

Summary: The County OES' Volunteer Coordinator, participates in the San Diego VOAD (Volunteer Organizations Active in Disasters) General Meeting on a monthly basis. There, each organization, including the County OES' representative, give updates on efforts provided within the Operational Area. There are also talks surrounding coordination for efforts needed. Participants of this meeting are made up of local, state, and federal organizations, as well as non-governmental organizations, to include faithed based partners.

The County OES' Volunteer Coordinator also holds a meeting with non-governmental organizations that make up the County's Feeding Taskforce every two months. This meeting is designed to discuss organizations' roles, resources, and capabilities as it pertains to ensuring food security within the region, should the American Red Cross' feeding operations become overwhelmed.

The County OES Ops Coordinator hosts bimonthly Emergency Managers' meetings to leverage access to, planning with, and partnership development with the 18 cities, special districts, and other key Emergency Managers.

The County OES Ops Coordinator is managing the deployment of the regional Full Scale Exercise project that will occur in January 2023. Monthly planning meetings started in February 2022, and meetings have attracted and leveraged access to more than 85 key stakeholders at all levels of government and nonprofit agencies working together for a common goal.

The COVID-19 Pandemic caused a lapse in the meetings of these groups, and it has been challenging to gain traction with these meetings. However, this project is still relevant and ongoing. Interactions with these groups play a vital role in County OES' operations during an Emergency Operations Center (EOC) activation.

5. **Action/Project Title:** Publicize and encourage the adoption of appropriate hazard mitigation actions throughout the region

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Planning & Development Services, County Fire, County Communications Office, County Technology Office

   Project Status: Delayed and Ongoing

   Explain: Priorities shifted due to COVID-19 pandemic. There were also staffing changes.

   Summary: There have been staffing changes, which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include developing and posting protective actions community members can take to prepare themselves for emergencies and natural disasters from 2018 and thereon on County OES social media platforms in English and in Spanish, the dissemination of the updated Personal Disaster Plans translated into 12 languages, printing of flyers AlertSanDiego, and the SD Emergency app disseminating these flyers at community events and presentations.

   Community members have been encouraged to take appropriate hazard mitigation actions through alert and warning postings and press releases posted to the Ready

San Diego website, AlertSanDiego, the SD Emergency app, county news center articles. Campaigns were also conducted to increase the number of community members registered for AlertSanDiego Lyft (2018). Hazard mitigation messages have been developed, written, and promoted through television interviews in English and Spanish.

These messages have also been provided to the Partner Relay network (a group with over 700 individuals) which is made of trusted community organizations who serve San Diego's diverse and underserved neighborhoods, as well as community members with limited English proficiency, through emails and trainings provided to the organizations. They can share these messages with the clients they serve. Numerous of these messages have also been translated into Spanish. The goal is to continue these efforts for the next few months leading through 2023.

Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic, staffing changes/staff turnover, completing trainings, the learning curve, competing priority projects, project also requires many staff hours, and collaboration is in part contingent on resources, others, invitations, creating opportunities to share the information with others and potentially funding for incentives to create additional opportunities to share the information with the public.

The project is still relevant and ongoing since the County is still at risk for emergencies and natural disasters and not all community members are informed on the County's resources, nor on what actions to take to prepare for emergencies and natural disasters before, during and after they occur. Public education, information, outreach and community engagement efforts will continue through January, 2023 and include attending presentations on preparedness, supporting staff with documentation and writing of internal documents, materials design & inventory, communications, review of current and past communications messages, draft updated templates with preparedness/hazard mitigation messages, post preparedness messages on social media platforms, preparedness interviews on television, create a Partner Relay capacity plan, Partner Relay Content Creation, Partner Relay train EOC liaisons, conduct countywide preparedness survey, outreach campaigns including on AlertSanDiego, SD Emergency app, and translations of documents from English to Spanish.

6. **Action/Project Title:** Building Codes

   Progress Report Period: January 1, 2020 to March 30, 2022

   Responsible Agency: County of San Diego, County Planning & Development Services (Building Division), and County Fire

   Project Status: Completed

   Summary: Building codes were reviewed to reflect current earthquake standards annually and update as necessary. County Staff attended jurisdictional conferences related code changes or updates related to seismic and other natural disasters. Groups included International Code Counsel, County Building Officials Association of California (CBOAC), California Building Officials (Calbo).

   This is an ongoing effort, and project is still relevant. Department suggests adding a review of fire and wind standards annually to include the most relevant natural disasters that effect our community.

7. **Action/Project Title:** Support public and private sector symposiums that emphasize hazard mitigation planning

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, Cities, and private sector partners

   Project Status: Completed and Ongoing

   Summary: County OES maintains a support posture of public and private sector symposiums with an emphasis on hazard mitigation. In September 2021, County OES participated with the Air Protection Control District (APCD) and the California Air Resource Board in a symposium tailored around air-quality. County OES also participates quarterly with San Diego Gas & Electric's (SDG&E's) Access and Functional Needs team to discuss ways the public can be best prepared for Public Safety Power Shutoffs.

   Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic and staffing changes/staff turnover. The department suggests this project should outline key deliverables and note specifically what is to be accomplished through supporting symposiums.

8. **Action/Project Title:** Maintain multi-jurisdictional/multi-functional training and annual exercises to enhance hazard mitigation

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), County Departments, All 18 Cities/appropriate Private Sector Agencies

   Project Status: Ongoing

   Summary: From Fall 2017 to Summer 2018, County OES staff planned and deployed a San Diego Regional Tabletop Exercise (TTX) conducted on June 18, 2018, completing the process with a published AAR/IP (After Action Report / Improvement Plan.) This was the result of a UASI grant proposal from OES.

   From Spring 2019 to October 2019, County OES' team planned a November 6, 2019 San Diego Regional Full Scale Exercise (FSE) across regional agencies at all levels of government and the private sector, in response to priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan – San Diego Urban Area, 2019-2022. They completed the process with a published AAR/IP. This was the result of a UASI grant proposal from OES.

   From Fall 2020 to July 2021, County OES' staff also planned a July 27, 2021 San Diego Regional TTX for government and nonprofit agencies across San Diego, with AAR After Action Report improvements in response to priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan – San Diego Urban Area, 2019-2022. They completed the process with a published AAR/IP. This was the result of a UASI grant proposal from County OES.

   To meet the priorities of San Diego MyTEPs for 2019-2022 and 2022-2025, OES's team kicked off planning for a January2023 regional FSE (Full Scale Exercise) in December 2021 and are currently hosting monthly planning meetings with large

regional stakeholder groups, attracting approximately 85 stakeholder agency members. A FSE planning team of about 30 members is now meeting, including all 18 City Emergency managers, and a variety of special districts such as water agencies, airport and ports, USAR (Urban Search and Rescue) team, as well as public safety partners. This exercise prioritizes testing core capabilities testing identified in the MyTEPs and testing regional response plans such as OA EOP, local EOPs and response plans.

The OA and local agency EOC response will be tested for a catastrophic natural and human caused hazard scenario. This FSE will also testing Emergency Public Information through a regional JIC response, EOC activation and response procedures across agencies and jurisdictions, recovery operations and Initial Damage Assessment, alert and warning, regional coordination and communication, terrorism response and infrastructure systems, such as water agency response in emergencies.

County OES staff from 2021 to April 2022, OES planned, developed, and deployed a 6-month long training program for new and existing OES Staffs for the all-hazards response Staff Duty Officer (SDO) program; with subsequent Qualification Board testing for all SDO Under Instruction candidates in April 2022, to certify and deploy them as SDOs for emergency response. Staff had a 100% pass rate through this intensive oral Qual Board and practical hands-on technical test.

From November 2021 to present, the County OES training officer promoted UASI and CSTI training courses to County OES staff, EOC responders and EOC partner agencies, to bolster training for local important courses such as EOC positions Specific training – Planning, management, operations and Finance/Admin, Public Information Officer course, Mass Care courses and Recovery Operations, among others and booked a local EOC Operations and Planning course in the San Diego IA EOC for November 2022.

On April 10, 2022, The County OES Ops Coordinator completed a County OES training program needs assessment to identify areas for improvement, as presented to County OES leadership, and plans are underway to continue to expand training in FY 2022-23.

To meet the priorities of the San Diego MyTEP (Multi-Year Training and Exercise Plan) – San Diego Urban Area, 2019-2022 and 2022-2025, County OES staff planned and conducted the following EOC exercises:

- Hot Wash on Two Coastal Incidents – Tongan Tsunami and Orange / San Diego County Oil Spill and generated After Action Lessons Learned for approximately 25 regional agencies at all levels of government.
- EOC Planning P, EOC Action Plan, Battle Rhythm and EOC Planning TTX 2/23/22
- EOC Operations functional training exercise 3/2/22
- Tongan Tsunami Advisory for San Diego FSE 1/18/22

Projects obstacles, problems and delays Coordinators were hired October 2021; departure of key staffs that managed projects, causing significant delays in initiatives, including Training & Exercises Lead departing.

Obstacles can arise any time such as when County OES staffs the EOC in emergencies and the two-year long COVID emergency activation caused competing priorities. The COVID emergency activation also delayed access to many training and exercise opportunities nationwide 2020 to 2022, due to social distancing health safety considerations. Other significant EOC activations that also tapped out staffs and changed priorities - wildfire season response, west coast oil spill, west coast tsunami advisory and other emergency EOC activations.

Regional FSE is an Ops Plan goal for fiscal include extensive staff turnover at County OES – five new Emergency Services year 2022, July 1, 2022 – June 30, 2023. Training and Exercise Planning remains a high priority for County OES.

9. **Action/Project Title:** Review and update annually regional emergency plans, Concept of Operation plans, protocols, and standard operating procedures

   Progress Report Period: January 2018 to January 2023

   Responsible Agency: County Office of Emergency Services (County OES), appropriate county Departments, and all 18 Cities/Special Districts

   Project Status: Delayed and Ongoing

   Explain: Project was delayed due to OES staff turnover.

   Summary: County OES created a Plan Revision Schedule which includes an annual cycle where Standard Operating Procedures (SOPs), Concept of Operations (ConOps), Continuity of Operations Plan (COOP), Site Evacuation Plan (SEP), Emergency Operations Plan (EOP), and Checklists are reviewed, updated, tested, validated, approved, and trained.

   This project is a priority for County OES and is contingent on collaboration with County OES staff members. County OES staff turnover caused deadline obstacles and time delays. This project is still considered relevant, and revisions/updates to regional emergency plans, ConOps, protocols, and SOPs are ongoing. County OES is updating the SOP Library document to include a revision, training, and testing schedule; review and approval process; review checklist; version control measures and storage location; handling confidential information process; and training, testing and validation process.

10. **Action/Project Title:** 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.

    Progress Report Period: January 2018 to January 2023

    Responsible Agency: County Office of Emergency Services (County OES), County Communications Office, and County Technology Office

    Project Status: Delayed and Ongoing

    Explain: The department is not aware of what would constitute the project as complete. The project could be considered ongoing. Since the potential for emergencies and natural disasters continues, the project still has relevancy. The project could stay the same or potentially be modified to recommend community members ideally prepare a kit with food, water to last at least three days, but three

days could also be a challenge with current inflation and perhaps that should be considered as well.

Summary: There have been staffing changes which limit the ability to report on the full scope of accomplishments for the reporting period. Awareness of accomplishments during this period include the vast number of files, emails, PowerPoint presentations, and documents left from the previous Public Outreach Specialist would indicate a high-level work ethic to achieve the Office of Emergency Services vision and the essential functions of the position. It should also be noted PowerPoint presentations created prior to the recent staffing changes indicate a recommendation to build a kit to last for 3 to 5 days.

Efforts to achieve this goal are visible in the recently updated Personal Disaster Plans. Page 40 of the plan encourages readers to prepare a home kit to service for at least three days without water or electricity. Additionally, these plans were made to consider individuals with access and functional needs. These disaster plans were translated and available in 12 languages. They are available for free to download from the OES website and are also regularly mailed out to community members who request a hard copy. The PowerPoint was used for a presentation at La Jolla Country Day on November 18, 2021, where the recommendation was made for those in attendance to build a preparedness kit to last 3-5 days. This project could be considered ongoing and be included in current and future public education, information, outreach, and community engagement efforts (These messages can continue to be shared with the public and included in future outreach programming through January 2023).

Obstacles, problems, or delays include shift in priorities due to COVID-19 pandemic, staffing changes/staff turnover, completing trainings, the learning curve, competing priority projects, project also requires many staff hours, and collaboration is in part contingent on resources, others, invitations, creating opportunities to share the information with others and potentially funding for incentives to create additional opportunities to share the information with the public.

11. **Action/Project Title:** Develop a Climate Action Plan

Progress Report Period: January 2018 to January 2023

Responsible Agency: Land Use & Environment Group and County Office of Emergency Services (County OES)

Project Status: Completed

Summary: For further details, please visit the County's Climate Action Plan website. [145]

[145] https://www.sandiegocounty.gov/content/sdc/sustainability/cap.html#:~:text=The%20County%20of%20San%20Diego,over%20the%20next%2030%20years.

7.2. PLAN UPDATE EVALUATION

TABLE 72: PLANNING AND MITIGATION EVALUATION

Plan Section	Considerations	Explanation
Planning Process	Should new jurisdictions and/or districts be invited to participate in future plan updates?	All jurisdictions within San Diego County are welcome to participate and will continue to be invited to participate in future plan updates.
	Have any internal or external agencies been invaluable to the mitigation strategy?	All internal and external planning partners are invaluable to our mitigation strategy. Internal partners assisted most with updating the hazard assessment, mitigation actions, strategies and providing progress reports. External partner assistance was most helpful related to climate change incorporation into hazards and updating the hazard assessment.
	Can any procedures (e.g., meeting announcements, plan updates) be done differently or more efficiently?	County OES recommends allotting more time for all planning partners to complete FEMA Handbook Tasks 5, 6 and 7 since these sections require greater amounts of time and effort to collaborate with additional team members, plan/document in-depth goals/objectives/actions and provide supporting documentation for previous plan accomplishments.
	Has the Planning Team undertaken any public outreach activities?	The Planning Team conducted public outreach activities outlined in Section 3 of this plan. Some future public outreach activities are outlined in Section 6 of this plan, but are not inclusive of all public outreach activities.
	How can public participation be improved?	Public participation may be improved with continued partner outreach, seminars, surveys, public education opportunities/presentations and other methods (both virtual and in-person) outlined in Section 6 of this plan.
	Have there been any changes in public support and/or decision- maker priorities related to hazard mitigation?	Public feedback details are provided in Section 3 of this plan. Updated priorities and reasoning are covered in Section 6 and 7 of this plan.
Capability Assessment	Have jurisdictions adopted new policies, plans, regulations, or reports that could be incorporated into this plan?	Jurisdiction-specific adoptions/incorporations are covered in individual annexes to this plan.
	Are there different or additional administrative, human, technical, and financial resources available for mitigation planning?	Not currently. The Planning Team will continue to monitor.
	Are there different or new education and outreach programs and resources available for mitigation activities?	The Planning Team will continue to monitor and seek opportunities to facilitate new education and outreach programs/resources, especially for priority actions outlined in Section 6 of this plan.
	Has NFIP participation changed in the participating jurisdictions?	For NFIP participation, see Sections 1 and 7 of this plan for the County of San Diego and associated plan annexes for all other participating jurisdictions.
Risk Assessment	Has a natural and/or technical or human-caused disaster occurred?	Disasters, such as, but not limited to, pandemic disease and wildfires, have occurred during the planning stages of this plan.
	Should the list of hazards addressed in the plan be modified?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new data sources and/or additional maps and studies	Not currently. The Planning Team will continue to monitor, assess, and update as needed.

Plan Section	Considerations	Explanation
Risk Assessment	available? If so, what are they and what have they revealed? Should the information be incorporated into future plan updates?	
	Do any new critical facilities or infrastructure need to be added to the asset lists?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Have any changes in development trends occurred that could create additional risks?	See the Development Section of this plan and the 2021 County of San Diego Vulnerability Assessment and Adaptation Report for a list of policies to minimize new residential development in very-high and high fire hazard severity zones, and increase resilience of existing development in high-risk areas.
	Are there repetitive losses and/or severe repetitive losses to document?	According to the 2022 FEMA Repetitive Loss Summary Report, the County of San Diego has 20 Repetitive Loss properties, and 3 Severe Repetitive Loss properties.

Plan Section	Considerations	Explanation
Mitigation Strategy	Is the mitigation strategy being implemented as anticipated? Were the cost and timeline estimates accurate?	The mitigation strategy experienced delayed implementation due to some staff/project manager turnover and decreased time available to plan and implement. Emergency Operations Center activation for the 2020 COVID-19 Pandemic affected timeline estimates.
	Should new mitigation actions be added to the Action Plan? Should existing mitigation actions be revised or eliminated from the plan?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new obstacles that were not anticipated in the plan that will need to be considered in the next plan update?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Are there new funding sources to consider?	Not currently. The Planning Team will continue to monitor, assess, and update as needed.
	Have elements of the plan been incorporated into other planning mechanisms?	Yes, e.g., the Emergency Operations Plan and other County emergency plans.
Plan Maintenance Procedures	Was the plan monitored and evaluated as anticipated?	The plan was monitored and evaluated as anticipated. However, it would have been more helpful to the Planning Team to have more time to complete Sections 5-7 of this plan, which will be accounted for in the next planning cycle.
	What are needed improvements to the procedures?	None currently. The Planning Team will continue to monitor, assess, and update as needed.

7.3. PLAN MAINTENANCE, MONITORING, EVALUATION, & UPDATES

Hazard Mitigation Plan maintenance is the process the Planning Team establishes to track the plan's implementation progress and to inform the plan update. The plan must include a description of the method and schedule for monitoring, evaluating, and updating it within a 5-year cycle. These procedures help to:

- Ensure that the mitigation strategy is implemented according to the plan.
- Provide the foundation for an ongoing mitigation program in your community.
- Standardize long-term monitoring of hazard-related activities.
- Integrate mitigation principles into community officials' daily job responsibilities and department roles.
- Maintain momentum through continued engagement and accountability in the plan's progress.

7.3.1 PLAN MONITORING

Plan monitoring means tracking the implementation of the plan over time. The plan must identify how, when, and by whom the plan will be monitored.

The Hazard Mitigation Planning Group (HMPG) participants listed in Section 2 of this plan 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 Office of Emergency Services (County OES) to integrate these updates into the Plan. County OES will be responsible for monitoring the Plan for updates on an annual basis.

Status of this plan's Mitigation Goals, Objectives, and Actions are tracked annually by County OES via a five-year cycle project plan and charter created by County OES. Every year, County OES will ask planning participants named in Section 2 of this plan to report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and strategies that should be revised.

7.3.2. PLAN EVALUATION

The Plan is evaluated by the County Office of Emergency Services (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 Hazard Mitigation Planning Group (HMPG) leads (or their select jurisdictional representative) based upon the initial STAPPLEE 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 by planning participants to County OES for inclusion in further updates to the Plan. The HMPG and each Local Mitigation Planning Team meet annually to discuss the status of this Plan.

7.3.3. PLAN UPDATES

Since this Plan's original adoption in 2005 the Hazard Mitigation Planning Group (HMPG) 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 most action items developed by the participating jurisdictions. Section 7.1 details the status of the action items from the 2018 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 HMPG to improve the document by eliminating actions that have been completed, adding new actions that have been identified since the plan's adoption and reprioritizing other actions to reflect new priorities 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.

The County Office of Emergency Services (County OES) will continue to be the responsible agency for updates to the Plan, and responsible for monitoring the Plan for updates on an annual basis. All HMPG participants will continue to be responsible to provide County OES with jurisdictional-level updates to the Plan annually or when/if necessary, as described above.

Status of this plan's Mitigation Goals, Objectives, and Actions are tracked annually by County OES via a five-year cycle project plan and charter created by County OES. Every year, County OES will ask planning participants named in Section 2 of this plan to report on the status of their projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and strategies that should be revised.

Every five years the plan will be updated and submitted to existing authorities outlined in Section 1 of this plan and Cal OES and FEMA for review.

Below is a general five-year timeline of when and how this plan will be updated, per FEMA guidelines and requirements outlined within FEMA's *"Local Mitigation Planning Handbook"* [146]:

- **YEAR 1 (FEBRUARY 7, 2023-DECEMBER 31, 2023):**
  - Complete FEMA Task 1 *("Determine the Planning Area and Resources")*
  - Complete FEMA Task 2 *("Build the Planning Team")*
  - Start FEMA Task 3 *("Create an Outreach Strategy)*

- **YEAR 2 (JANUARY 1, 2024-DECEMBER 31, 2024):**
  - Complete FEMA Task 3 *("Create an Outreach Strategy)*
  - Complete FEMA Task 4 *("Review Community Capabilities")*
  - Start FEMA Task 5 *("Conduct a Risk Assessment")*

- **YEAR 3 (JANUARY 1, 2025-DECEMBER 31, 2025):**
  - Complete FEMA Task 5 *("Conduct a Risk Assessment")*
  - Start FEMA Task 6 *("Develop A Mitigation Strategy")*

- **YEAR 4 (JANUARY 1, 2026-DECEMBER 31, 2026):**
  - Complete FEMA Task 6 *("Develop A Mitigation Strategy")*

[146] https://www.fema.gov/sites/default/files/2020-06/fema-local-mitigation-planning-handbook_03-2013.pdf.

- Complete FEMA Task 7 *("Keep the Plan Current")*

❖ **YEAR 5 (JANUARY 1, 2027-FEBRUARY 7, 2028)**
- Complete FEMA Task 8 *("Review and Adopt the Plan")*
- Complete FEMA Task 9 *("Create a Safe and Resilient Community")*

7.3.4. IMPLEMENTATION THROUGH EXISTING PROGRAMS AND OTHER PLANNING MECHANISMS

County and local jurisdictions have implemented most of the Priority Actions from the 2018 Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) through existing programs and procedures. Planning participants used (and will continue to use) this plan as a baseline of information related to priority hazards impacting their jurisdictions, to identify vulnerable communities and critical assets, and plan for their protection. The planning participants have also been able to refer to existing institutions, integrations, plans, policies, and ordinances defined for each jurisdiction, which was outlined in Section 2 of this plan (e.g., General Plan).

After regional adoption of this MJHMP update, planning participants will incorporate this plan into their General Plans and/or other comprehensive plans and procedures as those plans require review and revisions. **Some of those documents will implement and/or be informed by this plan, which include (and are not limited to):**

- San Diego County/Cities General Plans & Safety Element
  - Required incorporation of this plan's 2018 and 2023 updates, including evacuation information and priority hazards into the County's Safety Element (lead by Planning & Development Services) to demonstrate progress of local hazard mitigation efforts and ensure compliance with the California Government Code. Plan leads (listed in Section 2 of this plan) met as needed to collaborate on cohesive updates, then discuss how and where to include the update within their respective plans.[147]
- County Legislative Program
  - The vulnerability assessments, priority hazards, Goals, Objectives, and Actions/Priority Actions from this plan update helped the Office of Emergency Services' planning group inform the County Legislative Program's Priority Issues and Policy Guidelines through the addition of mitigation considerations and an all-hazard approach to disaster planning and legislation support.[148]
- San Diego County Evacuation and Sheltering Plans
  - This plan's priority hazards, hazard profiles, hazard mitigation actions/priority actions, and vulnerability assessments inform evacuation and sheltering plans to account for the safety of people and assets during all-hazard scenarios to the furthest extent feasible. Implementation of this plan's update ensure compliance with existing federal and state legislation.
- San Diego County Operational Area Emergency Operations Plan 2022
  - Hazard information from the MJHMP update was incorporated into the 2022 County of San Diego Operational Emergency Operations Plan (OA EOP) update.

[147] https://www.sandiegocounty.gov/content/sdc/pds/generalplan/GP-Progress-Reports.html#ProgressReports

[148] https://www.sandiegocounty.gov/content/sdc/cao/edga.html

All high significance hazards identified in the MJHMP update were addressed in the 2022 OA EOP update.

- State & Federal Hazard Mitigation Programs
    - Members from the Office of Emergency Services' planning group participated in interviews with Cal OES to share planning experiences and best practices from this plan's update, provide feedback on the State & Federal Hazard Mitigation Program, and provide recommendations for program and plan improvement.

Task Four of the FEMA Local Mitigation Handbook, Sections 1, 2, 4, and 7 of this plan, and jurisdiction-specific annexes describe the process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans. The County of San Diego specifically meets with all necessary partners to collaborate on planning mechanisms/updates, conducts an approval process through the public, department leadership, Unified Disaster Council (UDC) voting/approval, then Board of Supervisor and other elected official approval. All listed steps were conducted on necessary and required bases.

The administrative and technical capabilities of the County, as discussed in Sections 2 and 4 of this plan, provide an identification of the staff, personnel, and department resources available to implement the actions identified in Section 6 of this 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 human-caused hazards, floodplain managers, surveyors, personnel with GIS skills and scientists familiar with hazards in the community.

7.3.5. RESPONSE PLANS

Several other operational or functional response plans are also influenced by information contained in this plan. These plans include but are not limited to:

General Plan, Safety Element and Emergency Operations Plan, Annex Q – Evacuation: A review of the vulnerability and estimated losses detailed in the hazard profiles can help identify evacuation routes and locations, and their capacity, safety, and viability in different emergency scenarios.

These plans inform this plan by helping the Planning Group evaluate the impacts of multiple or cascading hazards, so that evacuees are not relocated into an area that puts them at risk from other hazards.

7.3.6. CONTINUED PUBLIC INVOLVEMENT

The 2018 plan was posted on the Hazard Mitigation page of the San Diego County Office of Emergency Services (County OES) webpage, and the public has always been encouraged to comment on the plan online. Once approved, this revised plan will be posted on the Hazard Mitigation webpage of the County OES website and participating jurisdictions will have links to the Plan on their websites.

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.

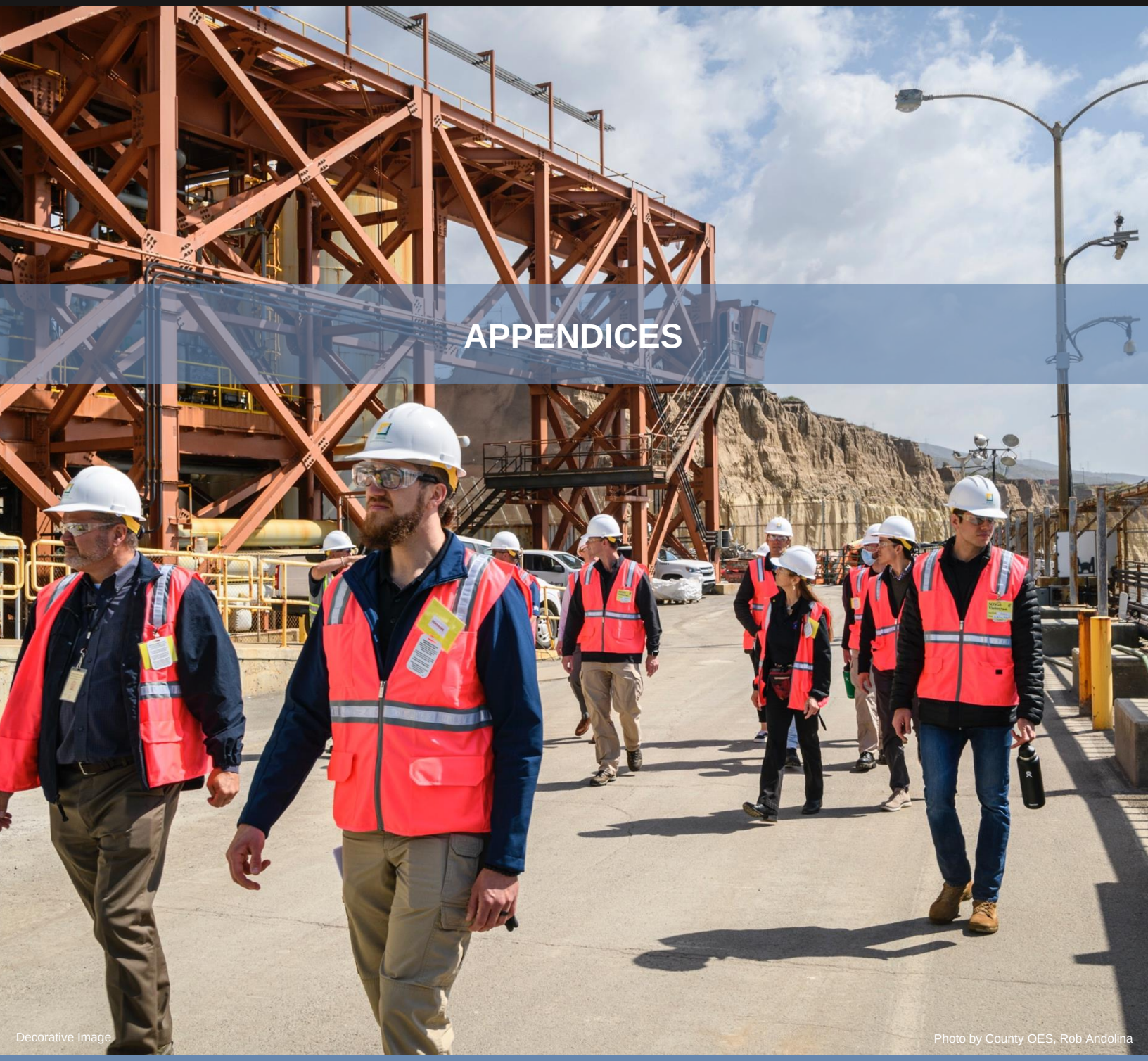
In addition, hard copies of the plan are catalogued and kept by the appropriate agencies in the county. The existence and location of these copies are also posted on the county website. To facilitate public comments, the County OES Hazard Mitigation webpage contains an email address for the public's use, which is monitored daily by County OES staff. Any questions or comments received on this website are forwarded to the appropriate member(s) of the HMPG for their review and response. County OES also tracks public comments on this plan.

A press release requesting public comments is also issued for each update, and after each evaluation. County OES also uses social media (Facebook, Twitter, etc.) to notify the public of any changes they should be aware of. These notifications direct people to the Hazard Mitigation webpage, where the public can review proposed changes.

Coupled with the dedicated email address for comments, this provides the public a simple, easily accessible manner to express concerns, opinions, or ideas about any updates/changes that are proposed to the Plan.

County OES will continue to be responsible for publicizing any changes to the Plan and maintaining public involvement.

APPENDICES



Decorative Image

Photo by County OES, Rob Andolina

San Diego County, California

2023

APPENDIX 1. BASE DATA SOURCES 2021

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
INFRASTRUCTURE	**OIL/GAS PIPELINES**	Homeland Infrastructure Foundation- Level Data (HIFLD) - NG PIPELINES	National Geospatial Intelligence Agency (NGA)	Buried Pipelines		
		Homeland Infrastructure Foundation- Level Data (HIFLD) - PETROLEUM PIPELINES	National Geospatial Intelligence Agency (NGA)	Pipelines		
	RAILROAD TRACKS	SDE.SANGIS.RAILROAD - RAIL_TYPE = 'TRAIN'	San Diego Association of Governments (SANDAG)	Railway Tracks	Excluded defunct freight lines	
		SDE.SANGIS.RAILROAD - RAIL_TYPE = 'TROLLEY'	San Diego Association of Governments (SANDAG)	Light Rail Tracks		
	HIGHWAY	California Department of Transportation	California Department of Transportation	Highway Roads (Major Roads + Urban Roads)		
CRITICAL FACILITIES	**AIRPORT FACILITIES**	SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.	Control Towers + Terminal Buildings + Parking Structures + Fuel Facilities + Maint/Hangar Facilities + Runways + Other	Excluded military and private facilities	Terminals-Large
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Terminals-Small
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Control Towers
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Runways: Asphalt -- includes major taxi-ways
		SDE.SANGIS.AIR_AIRPORTS + web	SanGIS + Google, etc.			Strips: Dirt, gravel, etc.
	BRIDGES	Homeland Infrastructure Foundation- Level Data (HIFLD) - Railroad Bridges	National Geospatial Intelligence Agency (NGA)	By material/design/length and by light rail/railroad/highway	Excluded any on military bases, and on reservations if not major road or greater	Added some highway bridges from imagery/NBI/SDE. No rail bridges were added as the data showed no new ones
		Homeland Infrastructure Foundation- Level Data (HIFLD) - National Bridge Inventory	National Geospatial Intelligence Agency (NGA)			
		SDE.SANGIS.BRIDGES	SanGIS			
	BUS FACILITIES	Homeland Infrastructure Foundation- Level Data (HIFLD) - Amtrak Stations	National Geospatial Intelligence Agency (NGA)	Urban Station + Fuel Facility + Dispatch Facility + Maintenance Facility		
		HAZUS + web	Federal Emergency Management Agency (FEMA) + Google, etc.			
		SDE.SANGIS.TRAN_STOPS_SG + web	SanGIS + Google, etc.			
	COMMUNICATION FACILITIES/ UTILITIES	Homeland Infrastructure Foundation- Level Data (HIFLD) - AM Antennas + HAZUS	National Geospatial Intelligence Agency (NGA)	Central Offices + Stations/Transmitters (AM or FM, TV stations, Weather stations, Other)		AM Antennas from previous analysis matched current HSIP/HAZUS data
		Homeland Infrastructure Foundation- Level Data (HIFLD) - FM Antennas + HAZUS	National Geospatial Intelligence Agency (NGA)			FM Antennas from previous analysis matched current HSIP/HAZUS data (two stations on reservation land were excluded as well)
		Homeland Infrastructure Foundation- Level Data (HIFLD) - TV Digital Transmitters + HAZUS	National Geospatial Intelligence Agency (NGA)			Added one digital TV transmitter up near San Marcos from HAZUS data- looked it up on FCC website and is active

		Homeland Infrastructure Foundation- Level Data (HIFLD) - Broadband Transmitters	National Geospatial Intelligence Agency (NGA)			Analog transmitters are no longer in use as of July 2021
						No changes
		Homeland Infrastructure Foundation- Level Data (HIFLD)- Weather Stations	National Geospatial Intelligence Agency (NGA)			Added for 2021- only 1 station
	ELECTRIC POWER FACILITIES	CEC - PP_SD	California Energy Commission	Transmission Substations + Distribution Circuits + Generation Plants	Excluded private facilities	Power plants
		CEC - Substation_SD	California Energy Commission		Substations on reservations NOT excluded (Campo)	Substations

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
CRITICAL FACILITIES, continued	**(EMERGENCY RESPONSE) EMERGENCY CENTERS, FIRE STATIONS, POLICE STATIONS**	Homeland Infrastructure Foundation- Level Data (HIFLD) - Local_EmergencyOperations Centers +SDE.SANGIS.FACILITY_CRITICAL	National Geospatial Intelligence Agency (NGA) + SanGIS	Emergency Operation Center		Includes 4 alternate locations
		SDE.SANGIS.FIRE_STATION	SanGIS	Fire Station	Excluded military and reservation facilities	
		SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + web + SDE.SANGIS.LAW_FACILITY	SanGIS	Police Station	Excluded military and reservation facilities	Included Customs + Border Patrol
	GOVERNMENT OFFICE/CIVIC CENTER	SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + visual/web analysis	SanGIS + Google, etc.	HAZUS: From General Building Stock - GOV1I (General Services) - not GOV2I (Emergency Response)	Excluded military and reservation facilities, and any facilities already covered by Emergency Response group	
	HOSPITALS / CARE FACILITIES	SDE.SANGIS.FACILITY_CRITICAL + SDE.SANGIS.PLACES + visual/web analysis	SanGIS + Google, etc.	Hospitals (Small/Medium/Large) + Medical Clinics (Clinics, Labs, Blood Banks)	Excluded hospitals without ER facilities	
	PORT FACILITIES	Homeland Infrastructure Foundation- Level Data (HIFLD) - Ports	National Geospatial Intelligence Agency (NGA)	Waterfront Structures + Cranes/Cargo Handling Equipment + Warehouses + Fuel Facilities	Excluded private facilities/marinas	NAV_UNIT_N = '32ND ST. NAVAL BASE' OR NAV_UNIT_N = 'SAN DIEGO UNIFIED PORT DISTRICT, BROADWAY PIER' -- used central port locations, not separate wharf/pier locations
	POTABLE WATER FACILITIES	HAZUS + web	Federal Emergency Management Agency (FEMA) + local governments + Google, etc.	Pumping Plants + Wells + Water Storage Tanks (0.5MGD to 2MGD) + Water Treatment Plants (Large/Med/Small)		Treatment Plants - included Carlsbad desalination facility (near complete)
		SDE.SANGIS.HYD_LAKE	SanGIS			Reservoirs (without adjacent plants)
	WASTE WATER FACILITIES	HAZUS + web	Federal Emergency Management Agency (FEMA) + local governments + Google, etc.	Treatment Plants (Large/Med/Small) + Lift Stations (Large/Med/Small)		Treatment Plants

	RAIL FACILITIES	Homeland Infrastructure Foundation- Level Data (HIFLD) - Intermodal Terminal Facilities	National Geospatial Intelligence Agency (NGA)	Railway: Urban Station + Fuel Facility+ Dispatch Facility + Maintenance Facility Light Rail: DC Substation + Dispatch Facility + Maintenance Facility		Terminal Facilities
		Homeland Infrastructure Foundation- Level Data (HIFLD) - Amtrak Stations	National Geospatial Intelligence Agency (NGA)			Amtrak Stations
		Homeland Infrastructure Foundation- Level Data (HIFLD) - Railroad Yards + web	National Geospatial Intelligence Agency (NGA) + Google, etc.			Yard Facilities
		SDE.SANGIS.TRAN_STOPS_SG + web	San Diego Association of Governments (SANDAG) + Google, etc.			Sprinter Stations
		Homeland Infrastructure Foundation- Level Data (HIFLD) - Fixed-Guideway Transit Stations + SDE.SANGIS.TRAN_STOPS_SG + web	National Geospatial Intelligence Agency (NGA) + San Diego Association of Governments (SANDAG) + Google, etc.			Transit Centers
	SCHOOLS	SDE.SANGIS.PARCELS_ALL	SanGIS	Grade Schools + Colleges/Universities (HAZUS data for SD is only grade schools -- not colleges/universities)	Excluded any on military bases and reservation land Excluded SOCtypes: Alternative Schools of Choice, Continuation High Schools, County	removed any that had closed- used CA dept of ed GIS to get updated schools and enrollments
		Community Analyst	Dun & Bradstreet, via Esri		Excluded private facilities and trade schools	Homeland Infrastructure Foundation- Level Data (HIFLD)- Type 1 universities/jr colleges only

TYPE	SECTION	SOURCES	CREDITS	HAZUS CLASSIFICATIONS	EXCLUSIONS	NOTES/ASSUMPTIONS
POPULATION + BUILDINGS	**POPULATION**	2019 Census	U.S. Census Bureau	Buried Pipelines		
	RESIDENTIAL BUILDINGS	SDE.SANGIS.PARCELS_ALL	SanGIS		Used an overlay of LANDUSE_SG to find residential parcels as ASR field is deprecated	
	COMMERCIAL BUILDINGS	Community Analyst	Dun & Bradstreet, via Esri			

APPENDIX 2. HAZARD DATA SOURCES 2021

NAME	SOURCES	QUERY (IF ANY)	NOTES (INCL. CREDITS)
Coastal Storm/Erosion	HYD_FLOODPL	FLD_ZONE = 'VE'	Federal Emergency Management Agency (FEMA)
Dam Failure	HYD_DAM_INUNDATION_DSOD		California Office of Emergency Services, County of San Diego, Division of Safety of Dams
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
Probabilistic Annualized 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	HAZUS, USGS		U.S. Geological Survey- ShakeMaps
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
Wildfire Hazard Severity Zones	FIRE_HAZARD_SEVERITY_ZONES	Definition qeuried to only show high and very high fire zones	Used composite version provided directly from CAL FIRE Fire Resource Assessment Program (FRAP) Team
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/
Tsunami	HYD_TSUNAMI_INUNDATION_AREA		California Emergency Management Agency (CalEMA), University of Southern California (USC) and California Geological Survey (CGS)

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APPENDIX 5. SURVEY RESULTS FOR SD MULTIJURISDICTIONAL HAZARD MITIGATION PLAN REVISION

There were 500 respondents for this anonymous survey. Of those respondents:

- 182 provided their e-mail address

QUESTION 1

All the 500 Respondents provided the cities or communities in which they live and work. Although there were respondents from all areas of the county:

- 11% of respondents claimed East County residency
- 59% of respondents claimed North County residency
- 30% of respondents claimed Central and Western County residency

QUESTION 2

Would you prefer emergency messages in a language other than English?

- 7% - Yes
- 93% - No

QUESTION 3

If ordered to evacuate, how much time would you require?

- 23% - 30 minutes or less
- 39% - 30 minutes to one hour
- 27% - one hour to two hours
- 11% - greater than two hours

QUESTION 4

Have you developed a personal disaster plan?

- 17% - Yes, for myself
- 35% - Yes, for myself and others
- 48% - No

QUESTION 5

Have you ever experienced or been impacted by a disaster?

- 45% - Yes
- 55% - No

QUESTION 6

If yes [to Question 5], please explain.

- 226 Responses

QUESTION 7

Have you taken any actions to make your home, business, or neighborhood more resistant to hazards?

- 54% - Yes
- 46% - No

QUESTION 8

If yes [to Question 7], please explain.

- 257 Responses

QUESTION 9

Have you accessed the online “Know Your Hazards” tool to determine what types of disasters are most likely to occur in your community?

- 24% - Yes
- 76% - No

QUESTION 10

Please select one hazard you think is the highest threat to your neighborhood.

- 49.49% - Structure/Wild Land Fires
- 23.34% - Earthquake
- 4.62% - Drought
- 5.63% - Climate change
- 2.21% - Coastal Storms/Erosion
- 0.20% - Tsunami
- 4.02% - Extreme heat
- 1.40% - Pandemic
- 0.20% - Landslide
- 0.60% - Severe Winter Storm
- 0.20% - Terrorism
- 1.40% - Extreme Wind
- 0.60% - Nuclear accident
- 0.20% - Hazardous Materials Incident
- 0.60% - Dam Failure

- 0.80% - Flood
- 0.60% - Oil or Gas line failure
- 0.40% - Liquefaction.
- 3.21% - Other

QUESTION 11

Please select one hazard you think is the second highest threat to your neighborhood.

- 16.22% - Structure/Wild Land Fires
- 30.22% - Earthquake
- 11.56% - Drought
- 11.56% - Climate change
- 1.41% - Coastal Storms/Erosion
- 1.21% - Tsunami
- 4.26% - Extreme heat
- 3.04% - Pandemic
- 2.23% - Landslide
- 1.62% - Severe Winter Storm
- 1.62% - Terrorism
- 4.05% - Extreme Wind
- 1.41% - Nuclear accident
- 0.81% - Hazardous Materials Incident
- 0.20% - Dam Failure
- 1.62% - Flood
- 2.43% - Oil or Gas line failure
- 0.00% - Liquefaction.
- 2.83% - Other

QUESTION 12

What is the most effective way for you to receive information about how to make your home, business, or neighborhood more resistant to hazards?

- 0.08% - Newspaper
- 44.64% - Email
- 4.24% - Television
- 3.43% - Public Workshops/Meetings
- 1.01% - Radio
- 20.40% - Internet
- 7.27% - Mail
- 11.31% - Social Media

- 6.86% - Other

QUESTION 13

Have you hardened your home against flying embers?

- 31% - Yes
- 69% - No

QUESTION 14

Have you created defensible space around your home?

- 54% - Yes
- 25% - No
- 20% - N/A

QUESTION 15

Have you designated an emergency contact outside of your home if the family should become separated?

- 57% - Yes
- 43% - No

QUESTION 16

Have you been trained in First Aid and CPR?

- 60% - Yes, both First Aid and CPR
- 4% - Yes, just First Aid
- 11% - Yes, just CPR
- 25% - No

QUESTION 17

Do you keep extra prescription drugs on hand in the case of an emergency?

- 57% - Yes
- 43% - No

QUESTION 18

Do you know how to protect yourself and others from being exposed to a virus?

- 96% - Yes
- 4% - No

QUESTION 19

Are you familiar with the services offered at a Family Assistance Center following a mass casualty incident?

- 21% - Yes
- 79% - No

QUESTION 20

How likely are you to stay in an emergency shelter following a disaster?

- 4% - Definitely
- 9% - Very Probably
- 22% - Probably
- 59% - Probably Not
- 6% - Definitely Not

QUESTION 21

Are you aware of how to safely dispose of household hazardous waste in your home? (i.e., used oil, old batteries, expired pesticides)

- 82% - Yes
- 18% - No

QUESTION 22

Has a Wireless Emergency Alert on your mobile phone ever made you take an emergency action?

- 38% - Yes
- 62% - No

QUESTION 23

Have you ever contacted 9-1-1?

- 68% - Yes, by phone
- <1% - Yes, by text
- 1% - Yes, by phone and text
- 31% - No

QUESTION 24

Do you know how to shut off the gas, electricity, and water to your home following an earthquake?

- 68% - Yes

- 32% - No

QUESTION 25

Do you have an emergency go-kit?

- 51% - Yes
- 49% - No

QUESTION 26

Do you have enough supplies to shelter in place at home for three days without functioning utilities?

- 80% - Yes
- 20% - No

QUESTION 27

Have you downloaded SD Emergency, the County's disaster preparedness mobile application?

- 49% - Yes
- 51% - No

QUESTION 28

Have you registered your mobile phone and email for AlertSanDiego, the County's regional mass notification system?

- 73% - Yes
- 27% - No

QUESTION 29

Do you feel prepared to cope with the aftermath of disasters?

- 59% - Yes
- 41% - No

QUESTION 30

Do you have an emergency action plan which includes details for handling pets, large animals, and livestock?

- 36% - Yes, just for pets
- 5% - Yes, for pets, large animals, and livestock
- 1% - No, for large animals and livestock
- 21% - No

- 37% - I do not have animals

QUESTION 31

Have you located two places where you can send or safely evacuate your pets?

- 37% - Yes
- 63% - No

QUESTION 32

Have you identified at least two places to meet in the event of an emergency: near the home and outside the immediate area?

- 38% - Yes
- 62% - No

QUESTION 33

Do you know the difference between an “Evacuation Warning” and an “Evacuation Order”?

- 90% - Yes
- 10% - No

QUESTION 34

How likely are you to evacuate if you receive an “Evacuation Warning” which directs you to prepare to evacuate and to evacuate early?

- 22% - Definitely
- 31% - Very Probably
- 29% - Probably
- 16% - Probably Not
- 2% - Definitely Not

QUESTION 35

How likely are you to evacuate if you receive an “Evacuation Order” which directs you to evacuate immediately?

- 75% - Definitely
- 17% - Very Probably
- 6% - Probably
- 2% - Probably Not
- <1% - Definitely Not

QUESTION 36

In your opinion, what are some steps your local government could take to reduce or eliminate the risk of future hazard damages?

- 284 Respondents

QUESTION 37

Are there any other issues regarding the reduction of risk and loss associated with hazards or disasters in the community that you think are important?

- 188 Respondents

QUESTION 38

If you are interested in receiving an invitation to a public meeting to review the results of this survey, please provide you email below?

- 188 Respondents

MEETING 1. HAZARD MITIGATION PLAN ORIENTATION MEETING

September 2019 / Time / Location

1. Introductions / Welcome
2. Overview of the Mitigation Plan
3. Review of Planning Process
   a. Current Scheduled Meetings
   b. Due Dates
4. Overview of new Mitigation Tools
   a. SurveyMonkey FEMA Worksheets
   b. Action Plan Assessments
   c. Hazard Mitigation Action Tracker
5. City / Jurisdiction Specific Planning
6. County Resilience Program
7. Changes to be Instituted
8. Questions / Comments
9. Adjourn

MEETING 2.

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Johnson, Donna	PHPR	[redacted]	X
Nissen, Dave	SD County Fire Authority		
Prus, Lisa	SDCWA		X
Millstein, Mel	LUEG		
Efird, Robert	PDS		
Nicoletti, Vince	PDS		
George, Richard	Sheriff's EPD		
Willis, Cleve	Sheriff's EPD		
Files, Shannon	Sheriff's EPD		
Batchelor, Jason	PDS		
Dawes, Ian	PDS		
Burton, Todd	HIRT		X
Agahi, Sara	DPW (Flood Control)		X
Isabel Corcos	PHS		X
Rob Sills	PHPR		X
Audrey Hamiliton	PDS		
Craig Shaffer	SD County Fire Authority		

MEETING 3. MULTI-JURISDICTION HAZARD MITIGATION PLAN UPDATE 2018 WORKING GROUP MEETING # 4

NAME	JURISDICTION/ AGENCY	TELEPHONE	EMAIL
Ryan DeHart	County of San Diego OES	[redacted]	[redacted]
Walter Amedee	National City		
Marlon King	Chula Vista		
Susy Turnbull	Poway		
Jamie Mott	Vista		
Andy McKellar	El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		
Sarah Gordon	SD County Communications Office		
Dave Pender	San Marcos		
David Harrison	Carlsbad		
John Garlow	Santee		
Perry Peake	Coronado		
Jeff Murdock	Escondido		
John French	Imperial Beach		
Neil Anderson	Oceanside		
Yvette LaDuke	Tsunami		
Alex Tardy	Storm / Tsunami / Wildfire		

MEETING 4.

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Walter Amedee	National City	[redacted]	
Marlon King	Chula Vista		
Susy Turnbull	Poway		X
Jamie Smith	Vista		
Andy McKellar	El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		X
Patricia Letts	Encinitas, Del Mar, Solana Beach		X
Lois Yum	Encinitas, Del Mar, Solana Beach		X

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Clem Brown	Encinitas, Del Mar, Solana Beach	[redacted]	X
Rimga Viskanta	Encinitas, Del Mar, Solana Beach		X
Dave Pender	San Marcos		
Don Rawson	Carlsbad		X
David Harrison	Carlsbad		
Justin Matsushita	Santee		
DeVerna Rogers	Santee		
Hannah Chasteene	San Diego		X
Eugene Ruzzini	San Diego		
Jeffrey Terwilliger	Coronado		
Jeff Murdock	Escondido		X
John French	Imperial Beach		X
David Parsons	Oceanside		
Pete Lawrence	Oceanside		
Brown, Matt	Port of San Diego		X
Croucher, Gary	San Miguel FPD		
Fred Cox	Rancho Santa FE FPD		
McBroom, Jason	Alpine FPD		X
Villarreal, Leonard	San Miguel FPD		
Larry Costello	Padre Dam MWD		X
Dambach, Dan	Vista Irrigation District		
Levion, Diana	Padre Dam MWD		
Del Bosque, Erick	Sweetwater Authority		
Olson, Gabriela	Valley Center MWD		
Prus. Lisa	SDCWA		
Sorce, Lisa	Padre Dam MWD		
Williams, Dennis	Valley Center MWD		
Woolslayer, Trisha	Vallecitos WD		
Pedrazzi, Ed	Vallecitos WD		
Newman, Richard	Alpine Union School District		

MEETING 7. 1/11/2021

NAME	JURISDICTION/ AGENCY	EMAIL	INITIAL
Ponce, Cruz	CalOES	[redacted]	X
McCready-Hoover, Karen	CalOES		X
LaMar-Haas, Victoria	CalOES		
Landry, Carly	CalOES		
Sutkus, Adam	CalOES		
Riley Kelly	CalOES		
Flores, Salvador	Imperial County		
Brown, Ethan	Orange County		
Phelps, Nikki	DHS		X
Mielish, Robert	DHS		X
Liu, Xing	FEMA Region 9		
Tardy, Alex	NWS / NOAA		
Anna Lowe	SANDAG		X
Ian Clampett	Scripps Oceanography		

MEETING 11. 4/12/2021

Full Name	Jurisdiction/Agency	Timestamp
DeHart, Ryan	County of San Diego OES	4/12/2021, 12:55:26 PM
Files, Shannon	San Diego County Sheriff's Department	4/12/2021, 12:56:21 PM
Khalili, Mehdi	San Diego County Flood Control	4/12/2021, 12:56:31 PM
Johnson, Donna L	County of San Diego PHS	4/12/2021, 12:58:15 PM
Schmid, Matthew	County of San Diego DPW	4/12/2021, 12:58:36 PM
Burton, Todd	San Diego County HIRT	4/12/2021, 12:58:50 PM
Schaffer, Craig	San Diego County Finance & General Government Group	4/12/2021, 12:59:19 PM
Agahi, Sara	San Diego County Flood Control	4/12/2021, 1:00:35 PM
Madrid, Michael	County of San Diego PDS	4/12/2021, 1:01:02 PM
Prus, Lisa	San Diego County Water Authority	4/12/2021, 1:09:21 PM
Julien, Jo Ann	County of San Diego PHS	4/12/2021, 1:09:36 PM

MEETING 12. 4/26/2022

NAME	JURISDICTION/AGENCY	EMAIL	INITIAL
Walter Amedee	National City	[redacted]	
Marlon King	Chula Vista		
Susy Turnbull	Poway		
Jamie Smith	Vista		
Andy McKellar	El Cajon, La Mesa, Lemon Grove		
Corina Jimenez	Encinitas, Del Mar, Solana Beach		X
Patricia Letts	Encinitas, Del Mar, Solana Beach		X
Lois Yum	Encinitas, Del Mar, Solana Beach		X
Clem Brown	Encinitas, Del Mar, Solana Beach		X
Rimga Viskanta	Encinitas, Del Mar, Solana Beach		X
Dave Pender	San Marcos		X
Don Rawson	Carlsbad		X
David Harrison	Carlsbad		
Justin Matsushita	Santee		
DeVerna Rogers	Santee		
Hannah Chasteene	San Diego		X
Eugene Ruzzini	San Diego		
Jeffrey Terwilliger	Coronado		
Jeff Murdock	Escondido		
John French	Imperial Beach		X
Russ Cunningham	Oceanside		
David Parsons	Oceanside		

Pete Lawrence	Oceanside	[redacted]	
David Foster	Port of San Diego		X
Tesoro, Cid	Port of San Diego		
Croucher, Gary	San Miguel FPD		
Fred Cox	Rancho Santa FE FPD		
McBroom, Jason	Alpine FPD		X
Villarreal, Leonard	San Miguel FPD		
Larry Costello	Padre Dam MWD		X
Dambach, Dan	Vista Irrigation District		
Levion, Diana	Padre Dam MWD		
Del Bosque, Erick	Sweetwater Authority		
Olson, Gabriela	Valley Center MWD		
Prus. Lisa	SDCWA		
Sorce, Lisa	Padre Dam MWD		
Williams, Dennis	Valley Center MWD		
Woolslayer, Trisha	Vallecitos WD		
Pedrazzi, Ed	Vallecitos WD		
Newman, Richard	Alpine Union School District		
Seifts, Rena	Ramona School District		

MEETING 15. CMP #7 AGENDA: 10/20/2021 @ 10 AM

INTRODUCTION

1. HAZUS DATA
2. FEMA WORK SHEET 5.1
3. COUNTY OF SD HAZMIT TRACKER
4. FEMA LOCAL PLAN REVIEW TOOL
5. PUBLIC FEEDBACK
6. UPDATED DEADLINES
7. QUESTIONS
8. ASSIGNMENT RECAP

HAZUS DATA

- The LUEG GIS Team created an excel file showing the counts of different types of critical facilities that fall within the boundaries of each jurisdiction:

  <<Preliminary_Critical_Facilities_Counts_By_Jurisdiction_10192021.xlsx>>

- The LUEG GIS Team also created a web map that shows all the participating jurisdictions and hazards across the county. It includes layers for:
  - Wildfire
  - Earthquakes
  - Floods
  - Coastal Erosion
  - Tsunamis
  - Dam Failures
  - Landslides and
  - Soil Liquefaction

The web map can be accessed via this link- Multi-Jurisdictional Hazard Mitigation Map:

https://gis-portal.sandiegocounty.gov/arcgis/home/webmap/viewer.html?webmap=44d3eaf08e9d4413832a685b721f26cc.

- Current top 5 hazards listed in the 2018 HazMit Plan are:

  Fire
  Hazardous Materials Release
  Flood
  Earthquake
  Manmade Hazards (Human Caused Hazards)

Assignment: Send me your input for top 5 County-wide Hazard rankings before our next County planning meeting (will be scheduled for the beginning of January 2022).

FEMA WORK SHEET 5.1

- Worksheet 5.1 SD County.docx

COUNTY OF SD HAZMIT TRACKER

- This tool mirrors the Goals, Objectives and Actions listed in Section 5 of the current Plan, and will enable us to efficiently update the Plan as a Team
- These goals are needed to get our plan approved by Cal OES and FEMA
- Assignment:
    - Review the “Objectives” and determine whether your department is responsible for an "Action"
    - Then, type your name or the responsible party's name and organization in the "Lead/Support" section. Multiple names/departments can be listed, just please to be sure to associate the person's name with their department. This will make it easy for OES, Cal OES or FEMA to contact someone directly if there is a question or clarification needed during the Plan's approval or revision process.
    - Last, determine then type whether the "Action" is new to the 2023 plan, existing from the 2018 plan or can be consolidated with another "Objective" or "Action"
    - Please complete this assignment by our next meeting date in January

FEMA LOCAL PLAN REVIEW TOOL

- Demonstrates how our Hazard Mitigation Plan meets regulations and enables Cal OES and FEMA to provide us with detailed feedback
- This tool also has HazMit Training, Guidance and Resources.
- Assignment: Please review this document and get familiar with the elements by our next meeting

PUBLIC FEEDBACK

- New format and scheduled date/time is pending.

UPDATED DEADLINES

- Planning Meeting #4 with jurisdictions is **next Tuesday, 10/26 @ 9AM-10 PM.**
- County Planning Meeting #8 is tentative for **early January**.
- Cal OES HazMit Funding Training tentative for **April 11th**.
- Our goal is to submit the Hazmit plan for Cal OES and FEMA approval by **early June 2022.**

QUESTIONS

- Any final questions?

ASSIGNMENT RECAP

- Dominique will send an email after this meeting with this agenda, attachments and other documents we discussed so you have all the information and tentative deadlines available.

MEETING 16. 10/26/2021

Full Name	Jurisdiction/Agency	Timestamp
Fonseca, Dominique	County of San Diego OES	10/26/2021, 8:58:20 AM
Ackerman, Shannon	County of San Diego DPLU	10/26/2021, 8:58:20 AM
Jamie Smith	Vista	10/26/2021, 8:58:20 AM
Katelynn Rise (Guest)	Oceanside	10/26/2021, 8:58:20 AM
Corina Jimenez	Del Mar/Encinitas/Solana Beach	10/26/2021, 8:58:23 AM
Susy Turnbull	Poway	10/26/2021, 8:58:50 AM
Zubel, Nicholas	County of San Diego OES	10/26/2021, 8:59:02 AM
Don Rawson	Carlsbad	10/26/2021, 8:59:05 AM
Allen, Tiffany	San Diego	10/26/2021, 8:59:26 AM
David Foster	Port of San Diego	10/26/2021, 8:59:27 AM
Jeff Murdock - Escondido (Guest)	Escondido	10/26/2021, 8:59:51 AM
Castellanos, Marielena	County of San Diego OES	10/26/2021, 8:59:57 AM
Clement Brown	Del Mar	10/26/2021, 9:00:33 AM
Pender, David	San Marcos	10/26/2021, 9:00:57 AM
Andolina, Robert	County of San Diego OES	10/26/2021, 9:01:04 AM
Walter Amedee (Guest)	National City	10/26/2021, 9:01:09 AM
Russ Cunningham (Guest)	Oceanside	10/26/2021, 9:01:15 AM
Andy McKellar (Guest)	El Cajon/La Mesa/Lemon Grove	10/26/2021, 9:02:11 AM
Anna Lowe	SANDAG	10/26/2021, 9:02:17 AM
Cid Tesoro	Port of San Diego	10/26/2021, 9:02:45 AM
Dawes, Ian	County of San Diego PDS	10/26/2021, 9:02:47 AM
Robles, Michael	County of San Diego OES	10/26/2021, 9:02:48 AM
Batchelor, Jason	County of San Diego PDS	10/26/2021, 9:02:52 AM
Ponce, Cruz@Caloes	CalOES	10/26/2021, 9:02:52 AM
Prus, Lisa	San Diego County Water Authority	10/26/2021, 9:03:35 AM
Thomlison, Nicholas	County of San Diego OES	10/26/2021, 9:04:40 AM
Rimga Viskanta	Encinitas/Del Mar/Solana Beach	10/26/2021, 9:06:07 AM
Larry Costello	Padre Dam MWD	10/26/2021, 9:06:33 AM

Full Name	Jurisdiction/Agency	Timestamp
Lois Yum	Encinitas/Del Mar/Solana Beach	10/26/2021, 9:07:46 AM
Marie Jones-Kirk	Carlsbad	10/26/2021, 9:13:54 AM

MEETING 19. SAN DIEGO COUNTY PLANNING MEETING #8

January 19, 2022 • 2:00 PM – 3:00 PM

AGENDA

1. **Welcome and Introductions**
2. **Survey Details**
    a. Current Translation Status
    b. Timeline and Document Location
3. **Assignments**
    a. SD County OES Worksheet 6.1/6.2 Guidance
    b. Deadlines and Worksheet Submission
4. **Funding Opportunities**
    a. NOI Deadlines
    b. BRIC Technical Assistance Application
5. **Action Items, Follow-Up Meetings, and Schedule**
    a. HAZMIT Planning Team Meeting Timeline
    b. County OES Actions/Deadlines
6. **Round Table/Questions**
7. **Adjourn**

PARTICPANT LIST

Carl Quiram, Sweetwater Authority
Prus, Lisa, San Diego County Water Authority
Emilyn Zuniga, Otay Water District
Ed Pedrazzi, Vallecitos Water District
Jason McBroom, Alpine Fire Protection District
Lisa Coburn-Boyd, Otay Water District
Kelly, Meghan, County of San Diego Land Use & Environment Group
Schmid, Matthew, County of San Diego DPW
Susy Turnbull, City of Poway
Charmaine Esnard, Rainbow Municipal Water District
Rubalcava, Eric, San Diego County Water Authority
Herbon, Goldamer, City of Oceanside
Jason McBroom, Alpine Fire Protection District
Dan Hayes, Sweetwater Authority
Alex Tardy, NOAA NWS
Clay Clifton, Sweetwater Authority
Mares, Marco, San Diego County Parks and Recreation

MEETING 20. SAN DIEGO COUNTY PLANNING MEETING #5

February 1, 2022 • 3:00 PM – 4:00 PM

AGENDA AND SCRIPT

1. **Welcome**
    a. Questions or concerns before we start.
    b. This meeting will be recorded.
2. **Public Feedback Survey/Advertisement Update**
    a. Working with the County Communications Office to publish the outreach survey and a County News article by the end of next week. I will provide you all details after I meet with our Communications Officer.
3. **Assignments**
    a. FEMA Worksheet 6.1/6.2 Wrap-up
        i. Worksheets 6.1 and 6.2 are due by today. If you need more time, please let me know.
        ii. Any questions or concerns related to Worksheets 6.1 or 6.2.
    b. FOUO Attachment A
        i. Last Friday, I sent some jurisdictions an email regarding the FOUO portion of the HazMit Plan called “Attachment.” Some folks experienced issues opening that email so please let me know if you need me to resent the material.
        ii. If you received the email regarding Attachment A, you will need to create your own FOUO portion of your annex or consolidate the FOUO portions into your annex in a manner that can be shared publicly. Any questions about Attachment A assignments?
    c. Start Task 7: FEMA Work Sheets 7.1/7.2
        i. Task 7 will help us keep the plan current and provide an update on the 2018 Goals, Objectives and Actions/priority projects.
        ii. 7.1- Mitigation Action Progress report form. Need to complete one form for each action/project identified in the 2018 plan and annexes your department or jurisdiction was responsible for. The bottom of the sheet has a summary that will provide Cal OES and FEMA with the documentation they need.
        iii. 7.2- only need to complete one form for your department or jurisdiction. This form walks you and your planning team through update considerations including plan maintenance procedures.
        iv. Questions?
4. **Funding and Training Opportunities**
    a. HMGP NOI Deadline extension (2/15/22)
    b. Cal OES Sub-Application Development Series: Advanced Assistance Webinar Dates
        i. All invitation information on our SharePoint site: https://sdcountycagov.sharepoint.com/sites/ExternalOESHub/HazardMitigation

ii. Sub-applications due 4/8/22

c. PrepCA State Initiative

i. PrepCA Jump Start: $15 million in state funding to assist eligible socially vulnerable and high hazard risk communities create resiliency through capacity building, mitigation, preparedness activities, education, response / recovery and/or future project scoping.

1. Proposals are due to Cal OES via email on 2/28/21.

ii. Prepare California Match under FEMA Hazard Mitigation Grant Program: additional $255 million in federal funding for FEMA hazard mitigation activities and projects benefiting eligible socially vulnerable and high hazard risk communities, and reduce risk to loss of life and property from natural hazards.

1. NOIs due to Cal OES on 2/15/22.

iii. Information and additional resources are available on the **Cal OES HMGP webpage** and in the **Revised 2021 Notice of Funding Opportunity.pdf**

iv. Prepare California Funding Opportunity Webinar on **2/3/22 at 11 AM.**

1. Information posted on our SharePoint site.

5. **Action Items, Follow-Up Meetings, and Schedule**

a. Deadlines

i. Complete all worksheets and FOUO Attachment A (if applicable to your jurisdiction) up to 7.1 and 7.2 by the next OA Planning Meeting
ii. Start planning methods for elected officials' briefings – should occur after UDC adoption of the updated plan which is anticipated on April 21st but is subject to change.

b. Next Meetings

i. OA Planning Meeting #6: March 7th

ii. OA Planning Meeting #7: April 6th

iii. Time for both is to be determined but I will be sending you all invites this week.

iv. Final OA Planning Meeting is tentative for the end of April or beginning of May. This will be when we should have our final draft complete and ready for final edits.

*Download/Save the meeting attendee list – click the 3 dots at the top next to the comment and people icons.

6. **Round Table/Questions**

7. **Adjourn**

ATTENDANCE LIST

Full Name	Jurisdiction/Agency	Timestamp
Andolina, Robert	County of San Diego OES	2/1/2022, 2:51:50 PM
Khalili, Mehdi	County of San Diego DPW	2/1/2022, 2:51:50 PM
Ackerman, Shannon (DPLU)	County of San Diego DPLU	2/1/2022, 2:56:48 PM
Emilyn Zuniga	Otay Water District	2/1/2022, 2:56:58 PM
Don Rawson	Carlsbad	2/1/2022, 2:58:00 PM
Jeffrey Terwilliger	County of San Diego EMS	2/1/2022, 2:58:08 PM
Jeff Murdock - Escondido (Guest)	Escondido	2/1/2022, 2:58:09 PM
Alisa Nichols	Vista Irrigation District	2/1/2022, 2:58:10 PM
David Parsons	Oceanside	2/1/2022, 2:58:19 PM
Zubel, Nicholas	County of San Diego OES	2/1/2022, 2:59:28 PM
Andy McKellar (Guest)	El Cajon/La Mesa/Lemon Grove	2/1/2022, 2:59:33 PM
Dan Hayes (Guest)	Sweetwater Authority	2/1/2022, 2:59:34 PM
Lois Yum	Del Mar/Encinitas/Solana Beach	2/1/2022, 2:59:40 PM
(Intern) Tam, Patricia@CalOES	CalOES	2/1/2022, 2:59:48 PM
Labra, Phillip@CalOES	CalOES	2/1/2022, 3:00:37 PM
Rimga Viskanta	Del Mar/Encinitas/Solana Beach	2/1/2022, 3:00:42 PM
Corina Jimenez	Del Mar/Encinitas/Solana Beach	2/1/2022, 3:00:45 PM
Madrid, Michael	County of San Diego PDS	2/1/2022, 3:00:45 PM
Pender, David	San Marcos	2/1/2022, 3:00:55 PM
Fonseca, Dominique	County of San Diego OES	2/1/2022, 3:00:57 PM
Herbon, Goldamer	San Diego County Water Authority	2/1/2022, 3:01:05 PM
Castellanos, Marielena	County of San Diego OES	2/1/2022, 3:01:11 PM
Russ Cunningham (Guest)	Oceanside	2/1/2022, 3:01:12 PM
Ayers, Barbara	County of San Diego OES	2/1/2022, 3:01:22 PM
Susy Turnbull	Poway	2/1/2022, 3:01:26 PM

Full Name	Jurisdiction/Agency	Timestamp
Prus, Lisa	San Diego County Water Authority	2/1/2022, 3:01:28 PM
Katelynn Rise (Guest)	County of San Diego Oceanside	2/1/2022, 3:01:28 PM
Burton, Todd	County of San Diego DEHQ	2/1/2022, 3:01:31 PM
Lubich, Marcus	County of San Diego Parks & Recreation	2/1/2022, 3:01:32 PM
Mares, Marco	County of San Diego Parks & Recreation	2/1/2022, 3:02:05 PM
Clement Brown	Del Mar	2/1/2022, 3:02:12 PM
Johnson, Donna L	County of San Diego PHS	2/1/2022, 3:02:36 PM
Schmid, Matthew	County of San Diego DPW	2/1/2022, 3:03:00 PM
Thomlison, Nicholas	County of San Diego OES	2/1/2022, 3:05:13 PM
Walter Amedee (Guest)	National City	2/1/2022, 3:10:13 PM
Rea, Stephen	County of San Diego OES	2/1/2022, 3:13:05 PM
David Foster	Port of San Diego	2/1/2022, 3:15:52 PM
Jander, Chelsea	County of San Diego Parks & Recreation	2/1/2022, 3:17:44 PM

MEETING 21. SAN DIEGO COUNTY PLANNING MEETING #9

February 11, 2022 • 10:00 AM – 11:00 AM

AGENDA

8. **Welcome**
9. **Public Feedback Survey/Advertisement Update**
10. **Assignments**
    a. FEMA Worksheet 6.1/6.2 Wrap-up
    b. Start Task 7: FEMA Work Sheets 7.1/7.2
11. **Funding and Training Opportunities**
    a. NOI Deadline
    b. BRIC Technical Assistance Application
    c. PrepCA State Initiative
    d. Cal OES Sub-Application Development Series: Advanced Assistance Webinar Dates
12. **Action Items, Follow-Up Meetings, and Schedule**
    a. Deadlines
    b. Next Meeting Release
13. **Round Table/Questions**
14. **Adjourn**

MEETING 23. SAN DIEGO OA PLANNING MEETING #6

March 7, 2022 • 1:00 PM – 2:00 PM

AGENDA

15. **Welcome**
16. **Public Feedback Survey Results**
17. **Assignments**
    a. FEMA Work Sheets 7.1/7.2 Wrap-up/Final Questions
    b. Start final FEMA Work Sheet (8.1)
    c. Finalize Updated Multi-Jurisdictional Hazard Mitigation Draft and all Annex edits
18. **Funding and Training Opportunities**
    a. PrepCA State Initiative
    b. Cal OES Sub-Application Development Series: Advanced Assistance Webinars
19. **Action Items, Follow-Up Meetings, and Schedule**
    c. Deadlines
    d. Next Meeting
    e. Next Steps
20. **Round Table/Questions**
21. **Adjourn**

ADDITIONAL PROOF OF ALL PARTICIPANT PARTICIPATION IN THE PLANNING PROCESS WAS COMPILED AND PROVIDED TO CAL OES AND FEMA. THIS PROOF HAS SENSITIVE CONTACT INFORMATION AND INCLUDES, BUT IS NOT LIMITED TO, PROOF OF VIRTUAL AND/OR IN-PERSON ONE-ON-ONE CALLS/MEETINGS/APPOINTMENTS, PARTICIPATION IN QUESTION & ANSWER SESSIONS, AND EMAILS.

Appendix E

Resolution No. 2026-XX

2025 UWMP Appendix F

Member Agency Local Supply Projections

Table F-1
Member Agency Surface Water Projections

Verifiable Projects

Member Agency	Reservoir	Projected Yield Verifiable Projects (AF/YR)				
		2030	2035	2040	2045	2050
Escondido, City of	Henshaw / Wohlford	3,000	3,000	3,000	3,000	3,000
Helix WD	Cuyamaca / El Capitan	1,864	1,864	1,864	1,864	1,864
San Diego, City of [1]	Barrett El Capitan Hodges Lower Otay Morena San Vicente Sutherland	29,475	29,475	29,475	29,475	29,475
	Cuyamaca	400	400	400	400	400
San Dieguito WD[2]	San Dieguito / Hodges	-	750	2,434	2,434	2,434
Santa Fe ID[2]	San Dieguito / Hodges	-	2,867	2,867	2,867	2,867
Sweetwater Authority	Loveland / Sweetwater	5,000	5,000	5,000	5,000	5,000
Vista I.D.	Henshaw	2,700	2,700	2,700	2,700	2,700
	Total	**42,439**	**46,056**	**47,740**	**47,740**	**47,740**

[1] Excludes supply to Cal-Am

[2] Due to DSOD restrictions, total of 1,744 AF anticipated through new dam construction (yield in 2035), returning to total 5,000 AF Yield

Additional Planned Projects

Member Agency	Reservoir	Project Type	Location	Project Status	Projected Yield Additional Planned Projects (AF/YR)				
					2030	2035	2040	2045	2050
Vista	Henshaw	Wellfield optimization into Henshaw	Warner Groundwater Basin	Feasibility Study completed	-	-	2000	2000	2,000
				Total	**–**	**–**	**2,000**	**2,000**	**2,000**

Table F-2
Member Agency Groundwater Projections

Verifiable Projects

Member Agency	Reservoir	Project Type	Groundwater Basin or Location	Projected Yield Verifiable Projects (AF/YR)				
				2030	2035	2040	2045	2050
Helix WD	*Groundwater Production Well 101*	Pump & Blend (with raw imported water)	*El Monte Basin*	*100*	*100*	*100*	*100*	*100*
Lakeside WD	*Vine Street Groundwater Production Facility*	Pump & Treat (blend with imported water)	*Santee Basin (San Diego River Basin)*	360	360	360	360	360
Oceanside, City of	Existing Mission Basin Groundwater Purification Facility	Brackish Groundwater Recovery & Treatment	Mission Basin (Lower San Luis Rey River Valley)	2,500	2,500	2,500	2,500	2,500
Oceanside, City of	Mission Basin Groundwater Purification Facility - Brine Minimization and Groundwater Well Expansion Project	Brackish Groundwater Recovery & Treatment	Mission Basin (Lower San Luis Rey River Valley)	860	860	860	860	860
Oceanside, City of	Mission Basin Groundwater Purification Facility - Pure Water Oceanside Injection into GW Basin Project	Brackish Groundwater Recovery & Treatment	Mission Basin (Lower San Luis Rey River Valley)	2,650	3,970	3,970	3,970	3,970
			Sub-total[1]	**2,650**	**2,290**	**2,290**	**2,290**	**2,290**
MCB Camp Pendleton	Groundwater Production Wells	Pump & Conventional Treatment	*Lower Santa Margarita, Las Flores, San Mateo, and San Onofre Basins*	10,400	10,400	10,400	10,400	10,400
Ramona Municipal Water District	Ramona Well Field Park	Park Irrigation	Santa Maria Valley	250	250	250	250	250
San Diego, City of	San Vicente GW Production Well	Pump & Blend	Santee/El Monte	*50*	*50*	*50*	*50*	*50*
	El Capitan GW Production Well	Pump & Blend	Santee/El Monte	*50*	*50*	*50*	*50*	*50*
Sweetwater Authority	Richard A. Reynolds Desalination Facility	Brackish Groundwater Recovery	San Diego Formation	*7,000*	*7,000*	*7,000*	*7,000*	*7,000*
	National City Well Field	Pump & Disinfection	San Diego Formation [National City Well Field]	*1,900*	*1,900*	*1,900*	*1,900*	*1,900*
			Sub-total	**8,900**	**8,900**	**8,900**	**8,900**	**8,900**
Yuima MWD	*Yuima MWD & Local Mutual Water Companies*	*Groundwater Extraction*	*Pauma Basin (Upper San Luis Rey River Valley)*	*7,500*	*7,500*	*7,500*	*4,000*	*4,000*
			Total Verifiable	**30,260**	**29,900**	**29,900**	**26,400**	**26,400**

[1] Volume injected into the Mission Basin via Pure Water Oceanside (see Table F-5) is excluded from the total brackish groundwater supply calculations to avoid double-counting, as this supply is already accounted for.

Additional Planned Projects

Member Agency	Reservoir	Project Type	Groundwater Basin or Location	Study/Project Status	Groundwater Additional Planned (AF/YR)				
					2030	2035	2040	2045	2050
Olivenhain MWD	San Dieguito Valley Brackish Groundwater Project	Brackish Groundwater Recovery	San Dieguito River Groundwater Basin	Hydrogeologic Investigations and Pump Testing	–	1,600	1,600	1,600	1,600
Sweetwater Authority	IPR Groundwater Injection	Groundwater Recharge	CPSD Basin	Feasibility Study	1,875	1,875	1,875	1,875	1,875
				Additional Planned Yields	**1,875**	**3,475**	**3,475**	**3,475**	**3,475**

Conceptual Projects and Ongoing Feasibility Studies

Member Agency	Reservoir	Project Type	Groundwater Basin or Location	Study/Project Status	Groundwater Conceptual (AF/YR)				
					2030	2035	2040	2045	2050
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*
Otay WD	Rancho del Rey Groundwater Well Development (Capacity)	Groundwater Recovery	Unknown	Feasibility Study & CEQA complete	–	-	500	500	500
Sweetwater Authority	Yield Optimization at Reynolds Desalination Facility	Groundwater Recovery	SDF	Project Concept/ Feasibility Study	1,750	1,750	1,750	1,750	1,750
Sweetwater Authority	Otay River Brackish Groundwater Desalination	Groundwater Recovery	CPSD Basin	Project Concept/ Feasibility Study	4,480	4,480	4,480	4,480	4,480
Lakeside WD	Riverview Well Field	Groundwater Recovery	Santee Basin (San Diego River Valley)	Project Concept/ Feasibility Study	–	400	400	400	400
				Projects Concept Yields	**6,230**	**6,630**	**8,530**	**8,530**	**8,530**

Table F-3
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
		2030			2055				
		P	S	T	P	S	T		
Carlsbad, City of	*Carlsbad WRF*	–	–	*7.0*	–	–	*7.0*	*1,000*	*Irrigation/ Industrial*
Encina Wastewater Authority	*Encina WPCF*	40.51	40.51	–	40.51	40.51	–	900	Outfall-Reuse
Escondido, City of	*Hale Avenue Resource Recovery Facility (HARRF)*	17	20	12	17	20	12	*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*
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*	2,713	2,713	–	–	–	–	897	*Outfall*
Oceanside, City of	*San Luis Rey WWTP*	9,096	9,096	3,360	11,810	11,810	3,360	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	16	16	18	18	18	1000 mg/L recycled water; 500 ng/L purified water	Irrigation, Santee Lakes, 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*
Ramona MWD	*Santa Maria WRP*	1.0	1.0	0.35	1.0	1.0	1.0	850	*Reuse-Irrigation*
Ramona MWD	*San Vicente WRP*	0.8	0.8	0.8	0.8	0.8	0.8	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*	0.000	0.000	0.145	0.000	0.000	0.175	1000	*Reuse - Irrigation*

Operating Agency	Treatment Facility Name	Planned Treatment Capacity						Effluent Quality for TDS (mg/L)	Disposal Method
		2030			2055				
		P	S	T	P	S	T		
San Diego, City of	*North City WRP*	52	52	52	52	52	52	1000	Reuse
San Diego, City of	*North City Pure Water Facility*	42.5	42.5	42.5	42.5	42.5	42.5	50-195	Reuse
San Diego, City of	*Point Loma WWTP*	240	–	–	240	–	–	1700-3000	Outfall
San Diego, City of	*Central Area WRP*	–	–	–	72	72	72	1000	Reuse
San Diego, City of	*South Bay WRP*	15	15	15	15	15	15	1000	Reuse-Outfall
San Elijo Joint Powers Authority	*San Elijo WRF*	5.25	5.25	–	5.25	5.25	–	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*	–	*0.44*	–	–	*0.440*	–	*1,000*	GW Percolation
Valley Center MWD	*Woods Valley Ranch WRF*	–	–	*0.275*	–	–	*0.450*	*1,000*	*Irrigation (Golf Course)*
Whispering Palms CSD	*Whispering Palms WPCF*	*0.5*	*0.5*	-	*0.5*	*0.5*	*0.5*	*963*	*Pasture-Percolation*

CSD - Community Services District
MWD - Municipal Water District
RRF - Resource Recovery Facility
TTP - Tertiary Treatment Plant
WPCF - Water Pollution Control Facility
WRF - Water Reclamation/Recycling Facility
WRP - Water Reclamation Plant
WWTP - Wastewater Treatment Plant

P - Primary Treatment
S - Secondary Treatment
T - Tertiary Treatment

Table F-4
Member Agency Recycled Water Projections

Verifiable Projects

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse [1]	Projected Verifiable Reuse (AF/YR) [2]				
				2030	2035	2040	2045	2050
Carlsbad MWD	Carlsbad WRF/Carlsbad MWD	Tertiary	Landscape, Agriculture, Industrial	1,518	1,518	1,518	1,518	1,518
	Meadowlark WRF (via Mahr Reservoir) /Vallecitos WD	Tertiary	Landscape, Agriculture	2,700	2,700	2,700	2,700	2,700
			Sub-total	**4,218**	**4,218**	**4,218**	**4,218**	**4,218**
Del Mar, City of	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	150	150	150	150	150
Escondido, City of	Hale Avenue RRF/WRF/City of Escondido	Tertiary	Landscape, Agriculture, Industrial/PR	4,400	4,400	4,400	4,400	4,400
Oceanside, City of	San Luis Rey WWTP/City of Oceanside - Phase 1 Expansion (RWF and Lower RW Ph I ECR Pipeline and FM Reservoir & PS)	Tertiary	Landscape	560	560	560	560	560
Oceanside, City of	San Luis Rey WWTP/City of Oceanside - Phase 1 Expansion (Lower RW Ph I - Customer Conversions)			381	422	431	431	431
			Sub-total	**941**	**982**	**991**	**991**	**991**
Olivenhain MWD	4S Ranch WRF/Olivenhain MWD	Tertiary	Landscape	1,500	1,500	1,500	1,500	1,500
	North City Water Reclamation Plant/City of San Diego	Tertiary	Golf Course Irrigation/HOAs	200	200	200	200	200
	Santa Fe Valley WRF/Rancho Santa Fe CSD	Tertiary	Landscape, Golf Course Irrigation	210	210	210	210	210
	Northwest Quadrant /Meadowlark WRF/Vallecitos WD	Tertiary	Landscape	329	329	329	329	329
	SEJPA	Tertiary	Landscape	250	260	265	270	275
			Sub-total	**2,489**	**2,499**	**2,504**	**2,509**	**2,514**
Otay WD	R. W. Chapman WRF/Otay WD	Tertiary	Landscape	1,100	1,100	1,100	1,100	1,100
	South Bay WRP/City of SD	Tertiary	Landscape	2,865	3,015	3,165	3,330	3,495
			Sub-total	**3,965**	**4,115**	**4,265**	**4,430**	**4,595**
Padre Dam MWD	Ray Stoyer WRF (Existing)	Tertiary	Replenishment of Santee Lakes [3]	–	–	–	–	–
Padre Dam MWD	Ray Stoyer WRF (Existing)/Padre Dam MWD (source water from ECAWP WRF starting in 2025)[4]	Tertiary	Landscape, Irrigation, Dust Control	1,232	1,232	1,232	1,232	1,232
			Sub-total	**1,232**	**1,232**	**1,232**	**1,232**	**1,232**
Camp Pendleton Marine Corps Base[5]	South WWTPs/USMC	Tertiary	Landscape and Golf Course	700	700	700	700	700
	South WWTPs/USMC	Tertiary	Injection - Las Flores Basin	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	890	890	890	890	890
			Sub-total	**2,910**	**2,910**	**2,910**	**2,910**	**2,910**

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse [1]	Projected Verifiable Reuse (AF/YR) [2]				
				2030	2035	2040	2045	2050
Poway, City of	North City WRP/City of San Diego	Tertiary	Landscape, Agriculture	450	450	450	450	450
Ramona MWD	Santa Maria WRP/Ramona MWD	Tertiary	Landscape, Recreational Impound, Development	200	200	200	200	200
	San Vicente WRP/Ramona MWD	Tertiary	Landscape (golf course) Agriculture (orchard)	450	450	450	450	450
			Sub-total	**650**	**650**	**650**	**650**	**650**
Rincon Del Diablo MWD	Hale Avenue RRF/City of Escondido HGWRP/Rincon MWD	Tertiary	Landscape, Industrial	2,050	2,080	2,080	2,080	2,080
San Diego, City of	North City & South Bay WRPs/ City of San Diego	Tertiary	Landscape, Industrial	9,152	9,152	9,152	9,152	9,152
San Dieguito WD	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	700	700	700	700	700
Santa Fe ID	San Elijo WRF/San Elijo JPA	Tertiary	Landscape	650	650	650	650	650
Valley Center MWD	Woods Valley Ranch WRF/VCMWD	Tertiary	Landscape Irrigation/Golf Course Irrigation	250	275	350	350	350
			Total	**34,207**	**34,463**	**34,702**	**34,872**	**35,042**

Additional Planned Projects

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse [1]	Projected Additional Planned Reuse (AF)					Project Phase
				2030	2035	2040	2045	2050	
Escondido, City of	MFRO Facility for agricultural users	*Tertiary*	*Landscape, Agriculture, Industrial, PR*	*3,400*	*3,400*	*6,800*	*6,800*	*6,800*	*FS*
Camp Pendleton Marine Corps Base	South WWTPs/USMC	*Tertiary*	*Indirect Potable Recharge*	*900*	*900*	*900*	900	*900*	*Design*
Valley Center MWD	Woods Valley Ranch WRF (Phases 3B & 4)	Tertiary	Landscape Irrigation	–	–	–	90	150	Planning
			Total	***4,300***	***4,300***	***7,700***	***7,790***	***7,850***	

Conceptual Projects and Ongoing Feasibility Studies

Purveyor	Supply Source Treatment Plant/Agency	Treatment Level	Type of Reuse [1]	Projected Additional Planned Reuse (AF)					Project Phase
				2030	2035	2040	2045	2050	
City of Oceanside	San Luis Rey WWTP/City of Oceanside - Hydranautics Conversion	Tertiary	Industrial Process Water	275	275	275	275	275	FS
	San Luis Rey WWTP/City of Oceanside - Upper Phase 1 RW System Expansion	Tertiary	Landscape/Golf Course Irrigation			326	326	326	Concept
	San Luis Rey WWTP/City of Oceanside - Upper Phase 2 RW System Expansion	Tertiary	Agriculture	–	–	-	1,819	1,819	Concept
	San Luis Rey WWTP/City of Oceanside - Lower Phase 2/3 RW System Expansion	Tertiary	Landscape	–	–	1,140	1,140	1,140	Concept
			Sub-total	**275**	**275**	**1,741**	**3,560**	**3,560**	
Camp Pendleton Marine Corps Base	South WWTPs/USMC	Tertiary	Irrigation, Residential	56	56	56	56	56	Concept
	North WWTPs/USMC	Tertiary	Irrigation, Residential	260	260	260	260	260	Concept
			Sub-total	**316**	**316**	**316**	**316**	**316**	
Olivenhain MWD	Connection #1 - North City Water Reclamation Plant/City of San Diego (Extension 153)	Tertiary	Landscape	–	300	300	300	300	Concept
	Joint RW Transmission Project with SFID and OMWD/TBD (Bridges)	Tertiary	Landscape, Golf Course Irrigation	–	400	400	400	400	Concept
	Rancho Cielo (Phase I)	Tertiary	Landscape	–	30	30	30	30	Concept
	Rancho Cielo (Phase II)	Tertiary	Landscape		70	70	70	70	Concept
	SEJPA 1 (Gardenview Rd)	Tertiary	Landscape	44	44	44	44	44	Concept
			Sub-total	**44**	**844**	**844**	**844**	**844**	
Otay WD	North District Recycled System/ R.W. Chapman WRF/Otay WD	Tertiary	Landscape	–	-	4,400	4,400	4,400	*Concept*
Ramona MWD	Santa Maria WRP Tertiary Expansion	Tertiary	Landscape Irrigation	–	100	150	200	200	Concept
			Total	**635**	**1,535**	**7,451**	**9,320**	**9,320**	

[1] Does not include recycled water used for environmental enhancement.

[2] Projected verifiable projects are included in the Water Authority's 2025 UWMP reliability analysis.

[3] Recycled supplies used for replenishment of Santee Lakes are not reflected in the demand forecast; therefore, are not included here as a source.

[4] Ray Stoyer WFR was taken offline in October 2025. Recycled water for PDMWD will be produced by the ECAWP project.

[5] Recycled Water for Camp Pendleton is adjusted to include yield for beneficial use only.

Table F-5
Member Agency Potable Reuse Projections

Verifiable Projects

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)				
					2030	2035	2040	2045	2050
East County Advanced Water Purification JPA **(Helix WD)**	East County Advanced Water Purification JPA	Padre Dam MWD / SD County San. District / City of El Cajon	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	Padre Dam MWD / SD County San. District / City of El Cajon	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	5,040	5,040	5,040	5,040
San Diego, City of	PURE Water	San Diego, City of	Phase 1 North City / City of San Diego[1]	Indirect	33,600	33,600	33,600	33,600	33,600
	PURE Water	San Diego, City of	Phase 2 Central Area/ City of San Diego	Indirect	–	59,360	59,360	59,360	59,360
				Sub-total	**33,600**	**92,960**	**92,960**	**92,960**	**92,960**
				Total	**49,842**	**110,882**	**110,882**	**110,882**	**110,882**

[1] Per the 52 mgd capacity of North City WRP, 50 mgd of wastewater is input into the Water Reclamation Plant. Of that, 34 mgd goes to the NC Pure Water Facility in which 30 mgd (33,620 AFY) of potable reuse is produced (deposited into Miramar) and 4 mgd is blended back into the recycled water system (purple pipe) for a total non-potable reuse production of 10 mgd. The remaining mgd goes toward sludge to MBC and plant processes as well as l ses.

Conceptual Projects and Ongoing Feasibility Studies

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)				
					2030	2035	2040	2045	2050
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
Camp Pendleton Marine Corps Base	Indirect Potable Recharge			Indirect	1,770	1,770	1,770	1,770	1,770
Escondido, City of	Potable Reuse	Escondido, City of	Hale Avenue Resource Recovery Facility (HARRF) / City of Escondido	TBD	–	2,300	2,300	4,480	4,480
Olivenhain MWD	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	2,500

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)				
					2030	2035	2040	2045	2050
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	2,000
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			1,120	1,120	1,120
	Meadowlark Water Reclamation Facility Direct Potable Reuse		Meadowlark Water Reclamation Facility	Direct			2,200	2,200	2,200
				Sub-total	**–**	**–**	**3,320**	**3,320**	**3,320**
				Total	**1,770**	**8,570**	**15,390**	**17,570**	**17,570**

Table F-6
Member Agency Seawater Desalination Projections

Verifiable Projects

Lead Agency	Project Name	Projected Verifiable Use (AF/YR)				
		2030	2035	2040	2045	2050
Supplies to be purchased by Carlsbad MWD	Claude "Bud" Lewis Carlsbad Desalination Plant	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
	Total	**6,000**	**6,000**	**6,000**	**6,000**	**6,000**

Conceptual Projects and Ongoing Feasibility Studies

Lead Agency	Project Name	Conceptual (AF/YR)				
		2030	2035	2040	2045	2050
Otay WD	Otay WD/ Rosarito Beach	–	6,700	6,700	6,700	6,700
	Total	**–**	**6,700**	**6,700**	**6,700**	**6,700**

Table F-7
Member Agency Water Transfers

Verifiable Projects

Agency	Project Name	Projected Verifiable Use (AF/YR)				
		2030	2035	2040	2045	2050
Escondido, City of	San Luis Rey Water Transfer	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
	Total	**15,800**	**15,800**	**15,800**	**15,800**	**15,800**

Additional Planned Projects

Lead Agency	Project Name	Projected Additional Planned (AF/YR)				
		2030	2035	2040	2045	2050
Sweetwater Authority	IPR Surface Water Augmentation to Sweetwater Reservoir	6,450	6,450	6,450	6,450	6,450
Sweetwater Authority	Recycled Water Purchase from Otay Water District	155	155	155	155	155
	Total	**6,605**	**6,605**	**6,605**	**6,605**	**6,605**

2025 UWMP Appendix G

Water Authority Demands Provided by Metropolitan

Draft

(March 19, 2026)

San Diego County Water Authority

Normal Year

(Average of 1922-2021 Hydrology)

Demographics[1]	2030	2035	2040	2045	2050
Total Population	3,207,802	3,264,258	3,293,723	3,279,039	3,264,357
Household Population	3,099,642	3,154,023	3,184,015	3,170,109	3,156,199
Occupied Housing Units	1,184,316	1,224,004	1,258,375	1,270,068	1,281,761
Single Family	*671,869*	*676,521*	*678,943*	*678,997*	*679,051*
Multi-Family	*512,447*	*547,483*	*579,432*	*591,071*	*602,710*
Persons Per Household	2.62	2.58	2.53	2.50	2.46
Urban Employment	1,668,452	1,702,116	1,747,080	1,779,260	1,811,442

Conservation	2030	2035	2040	2045	2050
Conservation[2]	144,380	157,603	173,520	188,565	202,744
Installed Active Device Through FY2024/25	10,067	7,406	6,447	4,717	747
Code-Based and Price-Effect Savings	134,313	150,197	167,073	183,848	201,997

Total Demands After Conservation	2030	2035	2040	2045	2050
Total Demand	534,996	541,005	546,061	547,040	552,808
Retail Municipal and Industrial[3]	517,654	523,999	529,042	530,042	535,813
Retail Agricultural	17,342	17,006	17,019	16,998	16,995
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	0	0	0	0	0

Local Supplies	2030	2035	2040	2045	2050
Total Local Supplies	212,907	245,943	250,303	250,760	256,355
Groundwater Production	17,067	5,340	6,802	5,884	6,026
Surface Production	48,290	31,757	34,416	33,942	34,215
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	50,400	50,400	50,400	50,400	50,400
Groundwater Recovery	12,930	12,930	12,930	12,930	12,930
Recycling	84,220	145,516	145,755	147,605	152,785
M&I and Agricultural	*84,220*	*145,516*	*145,755*	*147,605*	*152,785*
Groundwater Replenishment	*0*	*0*	*0*	*0*	*0*
Seawater Barrier	*0*	*0*	*0*	*0*	*0*
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2030	2035	2040	2045	2050
Total Metropolitan Demands[4]	322,090	295,062	295,758	296,280	296,453
Consumptive Use	322,090	295,062	295,758	296,280	296,453
Seawater Barrier	0	0	0	0	0
Replenishment Water	0	0	0	0	0

All units are acre-feet except in Demographics Section. Totals may not foot due to rounding.

1. Based on SANDAG's Series 15 Forecast. Employment include self-employment estimated by Metropolitan.
2. Includes code-based, price-effect and existing active savings through fiscal year 2024/25.
   Does not include future active conservation savings. Conservation is 1990 base year.
3. Retail M&I projections include conservation.
4. Consumptive Use includes SDCWA exchange water. Replenishment water includes direct and in-lieu replenishment.

Draft

(March 19, 2026)

San Diego County Water Authority

Single Dry-Year

(Repeat of 1977 Hydrology)

Demographics[1]	2030	2035	2040	2045	2050
Total Population	3,207,802	3,264,258	3,293,723	3,279,039	3,264,357
Household Population	3,099,642	3,154,023	3,184,015	3,170,109	3,156,199
Occupied Housing Units	1,184,316	1,224,004	1,258,375	1,270,068	1,281,761
Single Family	*671,869*	*676,521*	*678,943*	*678,997*	*679,051*
Multi-Family	*512,447*	*547,483*	*579,432*	*591,071*	*602,710*
Persons Per Household	2.62	2.58	2.53	2.50	2.46
Urban Employment	1,668,452	1,702,116	1,747,080	1,779,260	1,811,442

Conservation	2030	2035	2040	2045	2050
Conservation[2]	144,380	157,603	173,520	188,565	202,744
Installed Active Device Through FY2024/25	10,067	7,406	6,447	4,717	747
Code-Based and Price-Effect Savings	134,313	150,197	167,073	183,848	201,997

Total Demands After Conservation	2030	2035	2040	2045	2050
Total Demand	534,792	540,799	545,854	546,832	552,599
Retail Municipal and Industrial[3]	517,457	523,799	528,841	529,840	535,610
Retail Agricultural	17,335	17,000	17,013	16,992	16,989
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	0	0	0	0	0

Local Supplies	2030	2035	2040	2045	2050
Total Local Supplies	220,861	247,100	252,154	253,132	258,898
Groundwater Production	20,360	0	0	0	0
Surface Production	47,351	32,654	37,469	36,597	37,183
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	56,000	56,000	56,000	56,000	56,000
Groundwater Recovery	12,930	12,930	12,930	12,930	12,930
Recycling	84,220	145,516	145,755	147,605	152,785
M&I and Agricultural	*84,220*	*145,516*	*145,755*	*147,605*	*152,785*
Groundwater Replenishment	*0*	*0*	*0*	*0*	*0*
Seawater Barrier	*0*	*0*	*0*	*0*	*0*
Other Non-Metropolitan Imports	0	0	0	0	0

Demands on Metropolitan	2030	2035	2040	2045	2050
Total Metropolitan Demands[4]	313,931	293,699	293,700	293,700	293,701
Consumptive Use	313,931	293,699	293,700	293,700	293,701
Seawater Barrier	0	0	0	0	0
Replenishment Water	0	0	0	0	0

All units are acre-feet except in Demographics Section. Totals may not foot due to rounding.

1. Based on SANDAG's Series 15 Forecast. Employment include self-employment estimated by Metropolitan.
2. Includes code-based, price-effect and existing active savings through fiscal year 2024/25.
   Does not include future active conservation savings. Conservation is 1990 base year.
3. Retail M&I projections include conservation.
4. Consumptive Use includes SDCWA exchange water. Replenishment water includes direct and in-lieu replenishment.

Draft

(March 19, 2026)

San Diego County Water Authority

Drought Lasting Five Consecutive Years

(Repeat of 1988-1992 Hydrology)

Demographics[1]	2030	2035	2040	2045	2050
Total Population	3,207,802	3,264,258	3,293,723	3,279,039	3,264,357
Household Population	3,099,642	3,154,023	3,184,015	3,170,109	3,156,199
Occupied Housing Units	1,184,316	1,224,004	1,258,375	1,270,068	1,281,761
Single Family	*671,869*	*676,521*	*678,943*	*678,997*	*679,051*
Multi-Family	*512,447*	*547,483*	*579,432*	*591,071*	*602,710*
Persons Per Household	2.62	2.58	2.53	2.50	2.46
Urban Employment	1,668,452	1,702,116	1,747,080	1,779,260	1,811,442

Conservation	2030	2035	2040	2045	2050
Conservation[2]	144,380	157,603	173,520	188,565	202,744
Installed Active Device Through FY2024/25	10,067	7,406	6,447	4,717	747
Code-Based and Price-Effect Savings	134,313	150,197	167,073	183,848	201,997

Total Demands After Conservation	2030	2035	2040	2045	2050
Total Demand	531,500	548,549	554,090	556,760	560,663
Retail Municipal and Industrial[3]	512,830	531,091	536,761	539,439	543,359
Retail Agricultural	18,671	17,458	17,329	17,321	17,303
Seawater Barrier	0	0	0	0	0
Groundwater Replenishment	0	0	0	0	0

Local Supplies	2030	2035	2040	2045	2050
Total Local Supplies	194,065	240,925	256,270	258,221	261,818
Groundwater Production	20,360	12,898	6,513	6,626	6,308
Surface Production	43,283	38,101	35,168	35,800	35,867
Los Angeles Aqueduct	0	0	0	0	0
Seawater Desalination	56,000	56,000	56,000	56,000	56,000
Groundwater Recovery	10,998	12,930	12,930	12,930	12,930
Recycling	63,425	120,997	145,659	146,865	150,713
M&I and Agricultural	*63,425*	*120,997*	*145,659*	*146,865*	*150,713*
Groundwater Replenishment	*0*	*0*	*0*	*0*	*0*
Seawater Barrier	*0*	*0*	*0*	*0*	*0*
Other Non-Metropolitan Imports	0	0	0	0	0

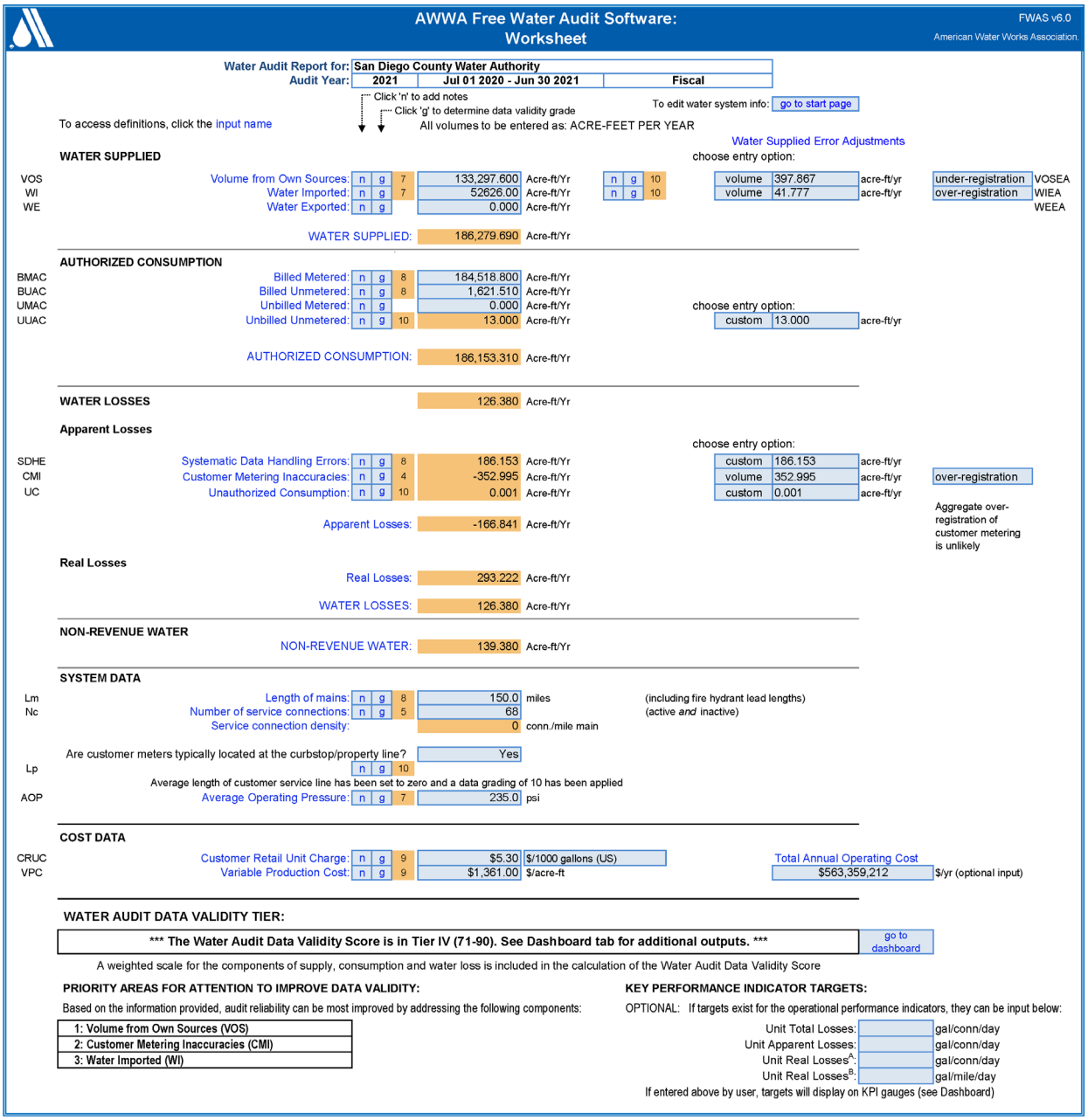
Demands on Metropolitan	2030	2035	2040	2045	2050
Total Metropolitan Demands[4]	337,435	307,624	297,820	298,539	298,844
Consumptive Use	337,435	307,624	297,820	298,539	298,844
Seawater Barrier	0	0	0	0	0
Replenishment Water	0	0	0	0	0

All units are acre-feet except in Demographics Section. Totals may not foot due to rounding.

1. Based on SANDAG's Series 15 Forecast. Employment include self-employment estimated by Metropolitan.
2. Includes code-based, price-effect and existing active savings through fiscal year 2024/25.
   Does not include future active conservation savings. Conservation is 1990 base year.
3. Retail M&I projections include conservation.
4. Consumptive Use includes SDCWA exchange water. Replenishment water includes direct and in-lieu replenishment.

2025 UWMP Appendix H

Distribution System Water Losses



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association

Water Audit Report for: San Diego County Water Authority
Audit Year: 2021 | Jul 01 2020 - Jun 30 2021 | Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade
To edit water system info: go to start page
To access definitions, click the input name
All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments

								choose entry option:			
VOS	Volume from Own Sources:	n	g	7	133,297.600	Acre-ft/Yr	n g 10	volume	397.867	acre-ft/yr	under-registration VOSEA
WI	Water Imported:	n	g	7	52626.00	Acre-ft/Yr	n g 10	volume	41.777	acre-ft/yr	over-registration WIEA
WE	Water Exported:	n	g		0.000	Acre-ft/Yr					WEEA
	WATER SUPPLIED:				186,279.690	Acre-ft/Yr					

AUTHORIZED CONSUMPTION

							choose entry option:			
BMAC	Billed Metered:	n	g	8	184,518.800	Acre-ft/Yr				
BUAC	Billed Unmetered:	n	g	8	1,621.510	Acre-ft/Yr				
UMAC	Unbilled Metered:	n	g		0.000	Acre-ft/Yr				
UUAC	Unbilled Unmetered:	n	g	10	13.000	Acre-ft/Yr	custom	13.000	acre-ft/yr	
	AUTHORIZED CONSUMPTION:				186,153.310	Acre-ft/Yr				

WATER LOSSES 126.380 Acre-ft/Yr

Apparent Losses

							choose entry option:			
SDHE	Systematic Data Handling Errors:	n	g	8	186.153	Acre-ft/Yr	custom	186.153	acre-ft/yr	
CMI	Customer Metering Inaccuracies:	n	g	4	-352.995	Acre-ft/Yr	volume	352.995	acre-ft/yr	over-registration
UC	Unauthorized Consumption:	n	g	10	0.001	Acre-ft/Yr	custom	0.001	acre-ft/yr	
	Apparent Losses:				-166.841	Acre-ft/Yr				

Aggregate over-registration of customer metering is unlikely

Real Losses

Real Losses: 293.222 Acre-ft/Yr

WATER LOSSES: 126.380 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 139.380 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	8	150.0	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	5	68		(active *and* inactive)
	Service connection density:				0	conn./mile main	
	Are customer meters typically located at the curbstop/property line?				Yes		
Lp		n	g	10			
	Average length of customer service line has been set to zero and a data grading of 10 has been applied						
AOP	Average Operating Pressure:	n	g	7	235.0	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$5.30	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$1,361.00	$/acre-ft	$563,359,212	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *** go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

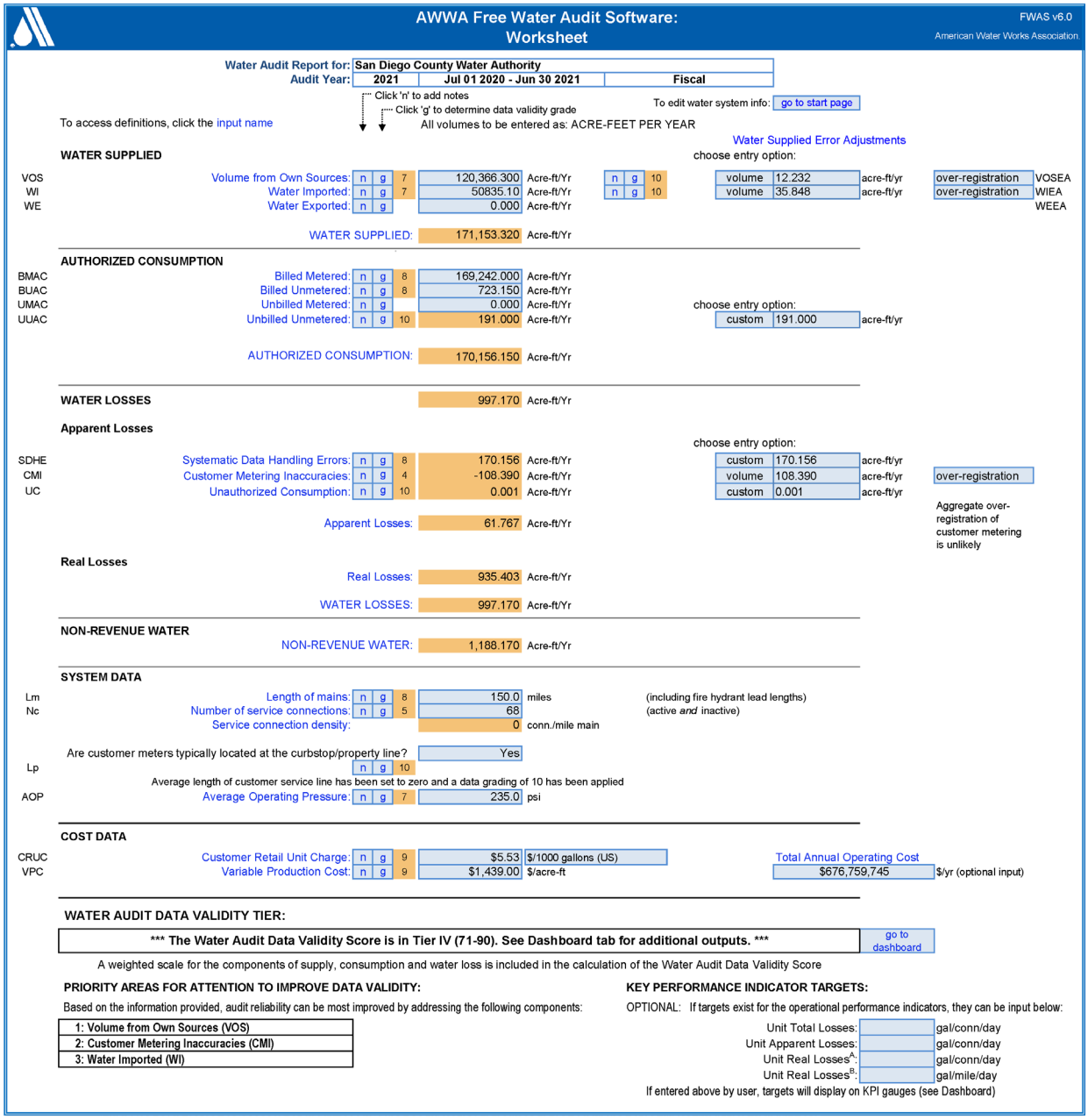
1: Volume from Own Sources (VOS)
2: Customer Metering Inaccuracies (CMI)
3: Water Imported (WI)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[A]:		gal/conn/day
Unit Real Losses[B]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.

Water Audit Report for: San Diego County Water Authority
Audit Year: 2021 | Jul 01 2020 - Jun 30 2021 | Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

VOS	Volume from Own Sources:	n	g	7	120,366.300	Acre-ft/Yr	n g 10	choose entry option: volume	12.232	acre-ft/yr	over-registration	VOSEA
WI	Water Imported:	n	g	7	50835.10	Acre-ft/Yr	n g 10	volume	35.848	acre-ft/yr	over-registration	WIEA
WE	Water Exported:	n	g		0.000	Acre-ft/Yr						WEEA
	WATER SUPPLIED:				171,153.320	Acre-ft/Yr						

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	8	169,242.000	Acre-ft/Yr				
BUAC	Billed Unmetered:	n	g	8	723.150	Acre-ft/Yr				
UMAC	Unbilled Metered:	n	g		0.000	Acre-ft/Yr	choose entry option:			
UUAC	Unbilled Unmetered:	n	g	10	191.000	Acre-ft/Yr	custom	191.000	acre-ft/yr	
	AUTHORIZED CONSUMPTION:				170,156.150	Acre-ft/Yr				

WATER LOSSES 997.170 Acre-ft/Yr

Apparent Losses

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	8	170.156	Acre-ft/Yr	custom	170.156	acre-ft/yr	
CMI	Customer Metering Inaccuracies:	n	g	4	-108.390	Acre-ft/Yr	volume	108.390	acre-ft/yr	over-registration
UC	Unauthorized Consumption:	n	g	10	0.001	Acre-ft/Yr	custom	0.001	acre-ft/yr	
	Apparent Losses:				61.767	Acre-ft/Yr				

Aggregate over-registration of customer metering is unlikely

Real Losses

	Real Losses:				935.403	Acre-ft/Yr
	WATER LOSSES:				997.170	Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 1,188.170 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	8	150.0	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	5	68		(active *and* inactive)
	Service connection density:				0	conn./mile main	
	Are customer meters typically located at the curbstop/property line?				Yes		
Lp		n	g	10			
	Average length of customer service line has been set to zero and a data grading of 10 has been applied						
AOP	Average Operating Pressure:	n	g	7	235.0	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$5.53	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$1,439.00	$/acre-ft	$676,759,745	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. ***

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

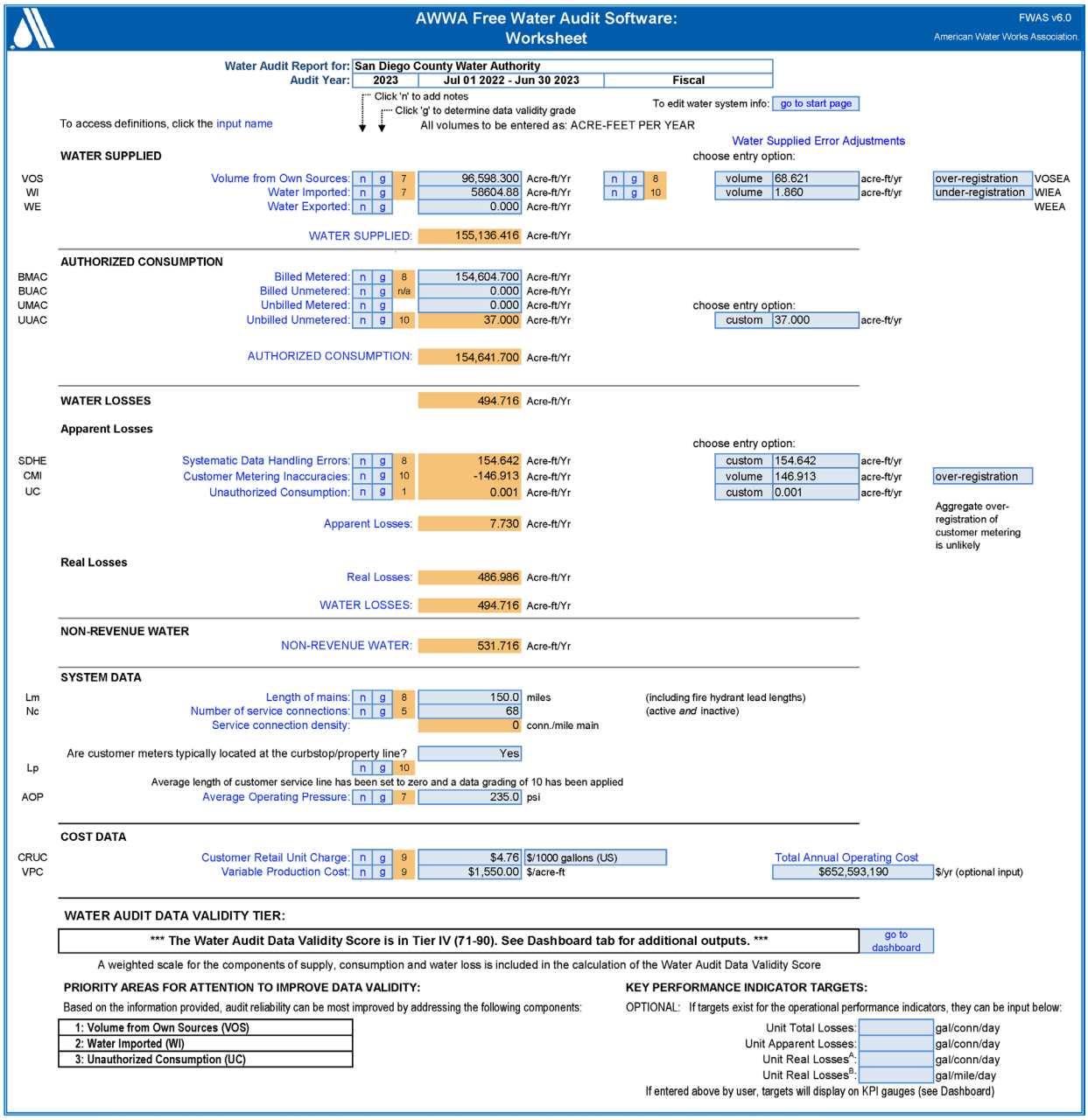
1: Volume from Own Sources (VOS)
2: Customer Metering Inaccuracies (CMI)
3: Water Imported (WI)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[A]:		gal/conn/day
Unit Real Losses[B]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.

Water Audit Report for: San Diego County Water Authority
Audit Year: 2023 | Jul 01 2022 - Jun 30 2023 | Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

VOS	Volume from Own Sources:	n	g	7	96,598.300	Acre-ft/Yr	n g 8	choose entry option: volume	68.621	acre-ft/yr	over-registration VOSEA
WI	Water Imported:	n	g	7	58604.88	Acre-ft/Yr	n g 10	volume	1.860	acre-ft/yr	under-registration WIEA
WE	Water Exported:	n	g		0.000	Acre-ft/Yr					WEEA
	WATER SUPPLIED:				155,136.416	Acre-ft/Yr					

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	8	154,604.700	Acre-ft/Yr				
BUAC	Billed Unmetered:	n	g	n/a	0.000	Acre-ft/Yr				
UMAC	Unbilled Metered:	n	g		0.000	Acre-ft/Yr	choose entry option:			
UUAC	Unbilled Unmetered:	n	g	10	37.000	Acre-ft/Yr	custom	37.000	acre-ft/yr	
	AUTHORIZED CONSUMPTION:				154,641.700	Acre-ft/Yr				

WATER LOSSES 494.716 Acre-ft/Yr

Apparent Losses

							choose entry option:			
SDHE	Systematic Data Handling Errors:	n	g	8	154.642	Acre-ft/Yr	custom	154.642	acre-ft/yr	
CMI	Customer Metering Inaccuracies:	n	g	10	-146.913	Acre-ft/Yr	volume	146.913	acre-ft/yr	over-registration
UC	Unauthorized Consumption:	n	g	1	0.001	Acre-ft/Yr	custom	0.001	acre-ft/yr	
	Apparent Losses:				7.730	Acre-ft/Yr				

Aggregate over-registration of customer metering is unlikely

Real Losses

	Real Losses:				486.986	Acre-ft/Yr
	WATER LOSSES:				494.716	Acre-ft/Yr

NON-REVENUE WATER

	NON-REVENUE WATER:				531.716	Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	8	150.0	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	5	68		(active *and* inactive)
	Service connection density:				0	conn./mile main	
	Are customer meters typically located at the curbstop/property line?				Yes		
Lp		n	g	10			
	Average length of customer service line has been set to zero and a data grading of 10 has been applied						
AOP	Average Operating Pressure:	n	g	7	235.0	psi	

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	9	$4.76	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	9	$1,550.00	$/acre-ft	$652,593,190	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

***** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *****

go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

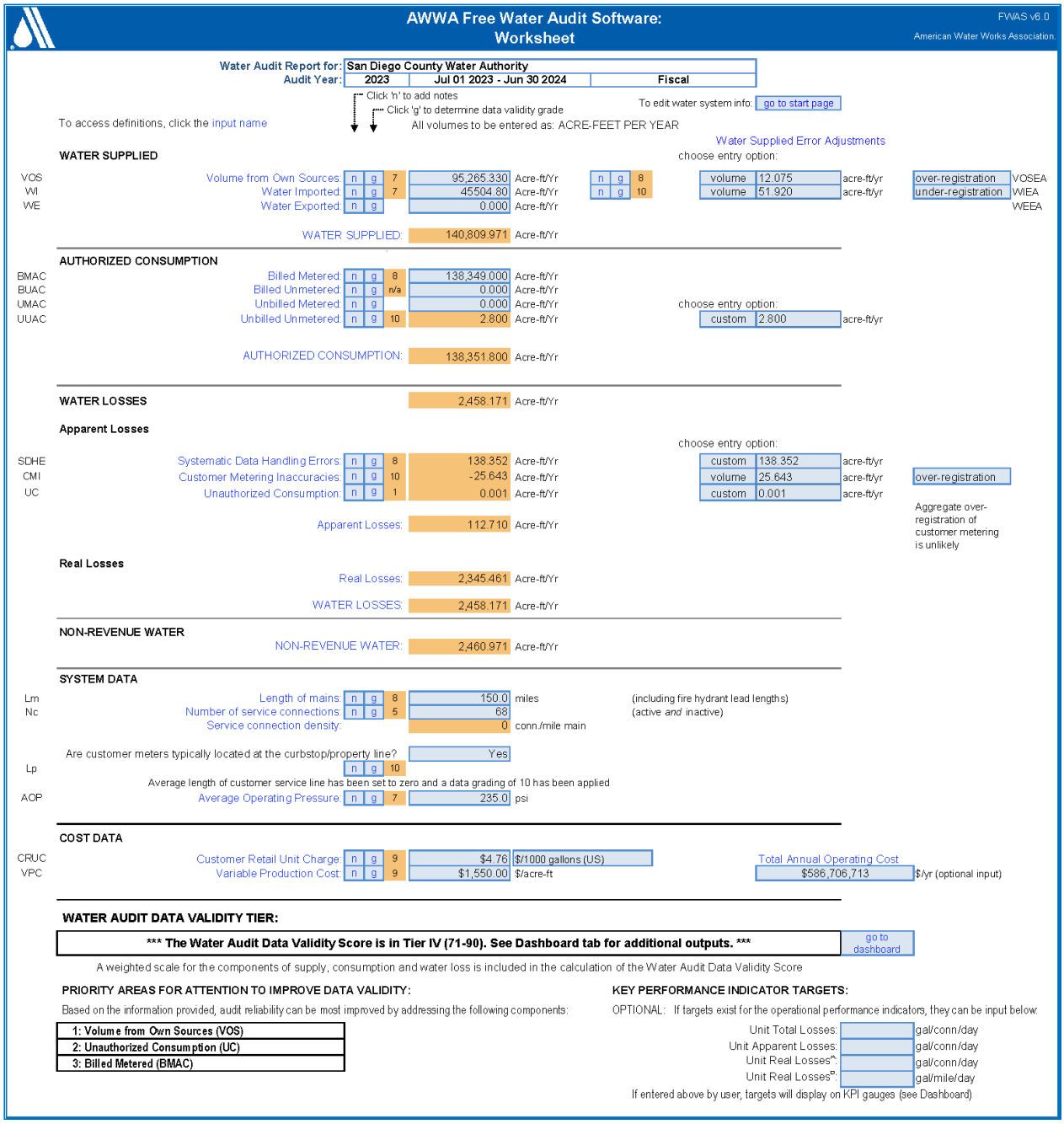
1: Volume from Own Sources (VOS)
2: Water Imported (WI)
3: Unauthorized Consumption (UC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[A]:		gal/conn/day
Unit Real Losses[B]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)



AWWA Free Water Audit Software: Worksheet

FWAS v6.0
American Water Works Association.

Water Audit Report for: San Diego County Water Authority
Audit Year: 2023 | Jul 01 2023 - Jun 30 2024 | Fiscal

Click 'n' to add notes
Click 'g' to determine data validity grade
To edit water system info: go to start page
To access definitions, click the input name
All volumes to be entered as: ACRE-FEET PER YEAR

WATER SUPPLIED

Water Supplied Error Adjustments
choose entry option:

		n	g				n	g					
VOS	Volume from Own Sources:	n	g	7	95,265.330	Acre-ft/Yr	n	g	8	volume 12.075	acre-ft/yr	over-registration	VOSEA
WI	Water Imported:	n	g	7	45504.80	Acre-ft/Yr	n	g	10	volume 51.920	acre-ft/yr	under-registration	WIEA
WE	Water Exported:	n	g		0.000	Acre-ft/Yr							WEEA
	WATER SUPPLIED:				140,809.971	Acre-ft/Yr							

AUTHORIZED CONSUMPTION

choose entry option:

		n	g						
BMAC	Billed Metered:	n	g	8	138,349.000	Acre-ft/Yr			
BUAC	Billed Unmetered:	n	g	n/a	0.000	Acre-ft/Yr			
UMAC	Unbilled Metered:	n	g		0.000	Acre-ft/Yr			
UUAC	Unbilled Unmetered:	n	g	10	2.800	Acre-ft/Yr	custom 2.800	acre-ft/yr	
	AUTHORIZED CONSUMPTION:				138,351.800	Acre-ft/Yr			

WATER LOSSES 2,458.171 Acre-ft/Yr

Apparent Losses

choose entry option:

		n	g							
SDHE	Systematic Data Handling Errors:	n	g	8	138.352	Acre-ft/Yr	custom 138.352	acre-ft/yr		
CMI	Customer Metering Inaccuracies:	n	g	10	-25.643	Acre-ft/Yr	volume 25.643	acre-ft/yr	over-registration	
UC	Unauthorized Consumption:	n	g	1	0.001	Acre-ft/Yr	custom 0.001	acre-ft/yr		
	Apparent Losses:				112.710	Acre-ft/Yr				

Aggregate over-registration of customer metering is unlikely

Real Losses

	Real Losses:			2,345.461	Acre-ft/Yr	
	WATER LOSSES:			2,458.171	Acre-ft/Yr	

NON-REVENUE WATER

	NON-REVENUE WATER:			2,460.971	Acre-ft/Yr	

SYSTEM DATA

		n	g				
Lm	Length of mains:	n	g	8	150.0	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	5	68		(active *and* inactive)
	Service connection density:				0	conn./mile main	
	Are customer meters typically located at the curbstop/property line?				Yes		
Lp		n	g	10			
	Average length of customer service line has been set to zero and a data grading of 10 has been applied						
AOP	Average Operating Pressure:	n	g	7	235.0	psi	

COST DATA

		n	g				Total Annual Operating Cost
CRUC	Customer Retail Unit Charge:	n	g	9	$4.76	$/1000 gallons (US)	$586,706,713 $/yr (optional input)
VPC	Variable Production Cost:	n	g	9	$1,550.00	$/acre-ft	

WATER AUDIT DATA VALIDITY TIER:

*** The Water Audit Data Validity Score is in Tier IV (71-90). See Dashboard tab for additional outputs. *** go to dashboard

A weighted scale for the components of supply, consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

1: Volume from Own Sources (VOS)
2: Unauthorized Consumption (UC)
3: Billed Metered (BMAC)

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses^:		gal/conn/day
Unit Real Losses*:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

2025 UWMP Appendix I

Water Authority's Energy Intensity Calculations

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 22 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 2024. The Water Authority's GHG emissions inventory for 2023 totaled 3,844 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 pump stations were responsible for 35% of its emissions in 2023 (1,347 MT CO2e). Twin Oaks Valley Water Treatment Plant (WTP) was the next largest source of emissions, accounting for 24% of total emissions (930 MT CO2e).

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. 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) 2023 and CY 2024. 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. (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 (Channelside) 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.

1. Consequential energy includes Rancho Peñasquitos Pressure Control Hydroelectric Facility (PCHF) because without water flowing these facilities would not generate energy.
2. Solar generation is not netted from energy consumed and is 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, less pumping (and electricity use) is required for treated water deliveries. Conveyance includes energy used for: Escondido , San Vicente, Olivenhain and Lake Hodges Pump Stations; untreated small facilities (miscellaneous, flow control, rectifiers). Rancho Peñasquitos PCHF was offline in 2023 and 2024 due to construction upgrades. When it returns to operation, 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 will be counted as consequential and is included as a negative number that is deducted from the total energy used that can produce a net negative energy intensity.

	CY 2023	CY 2024
Water Delivered (AF)	175,372	177,843
Energy Used (kWh)	5,577,028	12,117,814
Energy Intensity (kWh/AF)	31.8	68.1

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 2023	CY 2024
Water Delivered (AF)	31,758	34,192
Energy Used (kWh)	4,449,595	4,597,293
Energy Intensity (kWh/AF)	140.1	134.5

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 2023	CY 2024
Water Delivered (AF)	106,416	114,475
Energy Used (kWh)	1,864,139	193,897
Energy Intensity (kWh/AF)	17.5	1.7

Summary

The Water Authority's highest energy intensity comes from conveyance of untreated water.

2025 UWMP Appendix J

Reporting on Reduced Delta Reliance

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 2025 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).

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.

[1] *Urban Water Management Plan Guidebook 2025*, California Department of Water Resources, January 2026, p. C-1.
[2] *Ibid.*, p. C-2.

Summary of Expected Outcomes for Reduced Reliance on the Delta

As stated in WR P1 (c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for measurable reduction in Delta reliance and improved regional self-reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta.

The expected outcomes for the Water Authority's regional self-reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2025 –Final (Guidebook Appendix C) issued in January 2026. The data used in this analysis represent the total regional efforts of Metropolitan, the Water Authority, and its member agencies and were developed in conjunction with Metropolitan as part of the UWMP coordination process.

The following provides a summary of the near-term (2030) and long-term (2050) expected outcomes for SDCWA's Delta reliance and regional self-reliance. The results show that as a region, the Water Authority, Metropolitan, and its member agencies are measurably reducing reliance on the Delta and improving regional self-reliance, both as an amount of water used and as a percentage of water used.

Expected Outcomes for Regional Self-Reliance for the Water Authority:

- Near-term (2030) – Normal water year regional self-reliance is expected to increase by 488 TAF from the 2010 baseline; this represents an increase of about 66 percent of 2030 normal water year retail demands (Table 3).
- Long-term (2050) – Normal water year regional self-reliance is expected to increase by nearly 538 TAF from the 2010 baseline, this represents an increase of about 70 percent of 2050 normal water year retail demands (Table 3).

Process to Demonstrate Reduced Reliance on Delta

Consistent with Appendix C in the California Department of Water Resource's *Draft UWMP Guidebook 2025*[3] (DWR Guidebook), the analysis followed Steps 1 through 4 in the DWR Guidebook to document consistency with WR P1 and produce data and information covering the Water Authority's 2025 UWMPs. A list of Steps 1 through 4 is shown below.

1) Quantify the water use efficiency supply volume;
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. All data were obtained from the current 2025 UWMP or previously adopted UWMPs and represent average or normal water year conditions. Additionally, all analyses were conducted at the service area level, and all data reflect the total contributions of the Water Authority and its member agencies in conjunction with information provided by Metropolitan.

[3] *Ibid.*, p. C-6.

The Water Authority's Table 2-2 in its 2025 UWMP includes out-of-region demands established through exchange agreements supported by the 2025 settlement agreement between the Water Authority and Metropolitan. These out-of-region demands are not included in this Appendix J as they do not represent a demand within the Water Authority's service area.

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	2020 UWMP	Tables 2-4 and 9-1
2030, 2035, 2040, 2045,2050	2025 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.[4] In addition, consistent with the DWR Guidebook, actual water use was not used for the current year due to the influence of weather and other variables on water use.[5] Rather, UWMP normal year demand projections were used to represent current and future water use.

Table 2 Service Area Water Demands with Water Use Efficiency

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	708,990	647,285	587,581	555,758	469,303	479,452	490,100	494,811	500,617
Non-Potable Water Demands	33,668	38,660	40,459	41,936	34,207	34,463	34,702	34,872	35,042
Potable Service Area Demands with Water Use Efficiency Accounted For	675,322	608,625	547,122	513,822	435,096	444,989	455,398	459,939	465,575

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Population	3,113,498	3,271,773	3,340,594	3,442,340	3,207,802	3,264,258	3,293,723	3,279,039	3,264,357

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Per Capita Water Use (GPCD)	194	166	146	133	121	122	123	125	127
Change in Per Capita Water Use from Baseline (GPCD)		(28)	(47)	(60)	(73)	(72)	(70)	(68)	(66)
Estimated Water Use Efficiency Since Baseline		101,027	177,457	232,826	260,681	263,033	259,015	251,289	242,469

[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.

[4] *Ibid.*, p. C-16.
[5] *Ibid.*, p. C-7.

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 2050, 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, 2020, and 2025 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.

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	2050 (Optional)
Water Use Efficiency	-	101,027	177,457	232,826	259,532	261,884	257,866	250,140	246,330
Water Recycling	33,668	38,660	40,459	41,963	34,207	34,463	34,702	34,872	35,042
Stormwater Capture and Use									
Advanced Water Technologies	-	-	97,842	89,042	97,842	158,882	158,882	158,882	158,882
Conjunctive Use Projects									
Local and Regional Water Supply and Storage Projects	235,924	250,436	351,820	368,757	366,199	369,456	371,140	367,640	367,640
Other Programs and Projects the Contribute to Regional Self-Reliance									
Water Supplies Contributing to Regional Self-Reliance	269,592	390,123	667,578	732,588	757,780	824,685	822,590	811,534	807,894

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	708,990	748,312	765,038	788,584	728,835	741,336	747,966	744,951	746,947

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Water Supplies Contributing to Regional Self-Reliance	269,592	390,123	667,578	732,588	757,780	824,685	822,590	811,534	807,894
Change in Water Supplies Contributing to Regional Self-Reliance		120,531	397,986	462,996	488,188	555,093	552,998	541,942	538,302

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	38.0%	52.1%	87.3%	92.9%	104.0%	111.2%	110.0%	108.9%	108.2%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		14.1%	49.2%	54.9%	65.9%	73.2%	72.0%	70.9%	70.1%

Demonstration of Reduced Reliance on Water Supplies from the Delta Watershed

Metropolitan's service area as a whole, reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies and demand management measures. Quantifying the Water Authority's and its member agencies investments in self-reliance, locally, regionally, and throughout Southern California is infeasible for the reasons as noted in Section C.6. Due to the regional nature of these investments, the Water Authority is relying on Metropolitan's regional accounting of measurable reductions in supplies from the Delta Watershed.

The results shown in Table 4 demonstrate that Metropolitan's service area, including the Water Authority and its member agencies, is measurably reducing its Delta reliance. In the near-term (2030), the expected outcome for normal water year reliance on supplies from the Delta watershed decreased by 466 TAF from the 2010 baseline; this represents a decrease of 6 percent of 2030 normal water year retail demands. In the long-term (2050), normal water year reliance on supplies from the Delta watershed decreased by 537 TAF from the 2010 baseline; this represents a decrease of just over 9 percent of 2050 normal water year retail demands.

Table 4 Calculation of Reliance on Water Supplies from Delta Watershed [6]

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
CVP/SWP Contract Supplies	1,472,000	1,029,000	984,000	1,133,000	949,000	924,000	901,000	877,000	877,000
Delta/Delta Tributary Diversions	-	-	-	-	-	-	-	-	-
Transfers and Exchanges of Supplies from the Delta Watershed	20,000	44,000	91,000	58,000	77,000	77,000	78,000	78,000	78,000
Other Water Supplies from the Delta Watershed	-	-	-	-	-	-	-	-	-
Total Water Supplies from the Delta Watershed	**1,492,000**	**1,073,000**	**1,075,000**	**1,191,000**	**1,026,000**	**1,001,000**	**979,000**	**955,000**	**955,000**

Service Area Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
Service Area Demands without Water Use Efficiency Accounted For	5,493,000	5,499,000	5,219,000	4,925,000	4,969,000	5,102,000	5,209,000	5,302,000	5,391,000

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
Water Supplies from the Delta Watershed	1,492,000	1,073,000	1,075,000	1,191,000	1,026,000	1,001,000	979,000	955,000	955,000
Change in Supplies from the Delta Watershed	**NA**	**(419,000)**	**(417,000)**	**(301,000)**	**(466,000)**	**(491,000)**	**(513,000)**	**(537,000)**	**(537,000)**

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045	2050
Percent of Supplies from the Delta Watershed	27.2%	19.5%	20.6%	24.2%	20.6%	19.6%	18.8%	18.0%	17.7%
Change in Percent of Supplies from the Delta Watershed	**NA**	**-7.6%**	**-6.6%**	**-3.0%**	**-6.5%**	**-7.5%**	**-8.4%**	**-9.1%**	**-9.4%**

Metropolitan Member and Sub-Member Agency Infeasibility of Accounting Supplies from the Delta Watershed

Metropolitan's member agencies, including the Water Authority and its member agencies, individually contribute to reduced reliance on the Delta in two ways. First, through the development of local projects and demand management measures in their own service areas, and second through their investments in regional projects and programs through Metropolitan. Regional investments are funded through revenues from water purchases from Metropolitan or one or more of its member agencies. Metropolitan uses a portion of revenues from those purchases to fund projects and programs that contribute to the region's reduced reliance on Delta water supplies. Because some or all of these regional investments may not be constructed or implemented directly in a particular water supplier's service area, a water supplier's demands on Metropolitan or one or

[6] Metropolitan Water District of Southern California, *Draft 2025 UWMP*, February 2026, Appendix 10, Table A.10-3.

more of its member agencies will not accurately reflect that water supplier's total contributions to reduced reliance on supplies from the Delta watershed. It infeasible for a water supplier that makes investments in regional projects and programs to quantify its individual contributions to reduced reliance and reflect them properly in its demands on Metropolitan or one or more of Metropolitan's member agencies.

The following discussions outline how regional funding is provided through Metropolitan's local resources and conservation incentive programs and how funding for those programs is collected through Metropolitan's water rates. The history and participation of Metropolitan's member agencies and the local agencies that purchase water from Metropolitan's members in local resource and demand management in the region has spanned more than four decades, and thus makes accounting of these contributions at the individual agency level infeasible for those agencies to calculate.

Local Resources Programs

In 1982, Metropolitan began providing financial incentives to its member agencies to develop new local supplies to assist in meeting the region's water needs. Because of Metropolitan's regional distribution system these programs benefit all member agencies regardless of project location because they help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on Metropolitan's infrastructure, reduce system costs and free up conveyance capacity to the benefit of all the agencies that rely on water from Metropolitan. For example, the Groundwater Replenishment System (GWRS) operated by the Orange County Water District, is the world's largest water purification system for indirect potable reuse and was funded, in part, by Metropolitan's local resource program and its Member Agencies. Annually, GWRS produces approximately 103,000 acre-feet (AF) of reliable, locally controlled, drought-proof supply of high-quality water to recharge the Orange County Groundwater Basin and protect it from seawater intrusion. GWRS is a premier example of a regional project that significantly reduced the need to utilize imported water for groundwater replenishment in the Metropolitan Service area, increasing regional and local supply reliability and reducing the region's reliance on imported supplies, including supplies from the State Water Project.

Metropolitan's local resource programs have evolved through the years to better assist Metropolitan's member agencies in increasing local supply production. The following is a description and history of the local supply incentive programs.

Local Projects Program

In 1982, Metropolitan initiated the Local Projects Program (LPP), which provided funding to member agencies to facilitate the development of recycled water projects. Under this approach, Metropolitan contributed a negotiated up-front funding amount to help finance project capital costs. Participating member agencies were obligated to reimburse Metropolitan over time. In 1986, the LPP was revised. Changing the up-front funding approach to an incentive-based approach. Metropolitan contributed an amount equal to the avoided State Water Project pumping costs for each acre-foot of recycled water delivered to end-use consumers. This funding incentive was based on the assumption that local projects resulted in the reduction of water imported from the Delta and the associated pumping cost. The incentive amount varied from year to year depending on the actual variable power cost paid for State Water Project imports. In 1990, Metropolitan's Board increased the LPP contribution to a fixed rate of $154 per acre-foot, which was calculated

based on Metropolitan's avoided capital and operational costs to convey, treat, and distribute water, and included considerations of reliability and service area demands.

Groundwater Recovery Program

The drought of the early 1990s sparked the need to develop additional local water resources, aside from recycled water, to meet regional demand and increase regional water supply reliability. In 1991, Metropolitan conducted the Brackish Groundwater Reclamation Study which determined that large amounts of degraded groundwater in the region were not being utilized. Subsequently, the Groundwater Recovery Program (GRP) was established to assist the recovery of otherwise unusable groundwater degraded by minerals and other contaminants, provide access to the storage assets of the degraded groundwater, and maintain the quality of groundwater resources by reducing the spread of degraded plumes.

Local Resources Program

In 1995, Metropolitan's Board adopted the Local Resources Program (LRP), which combined the LPP and GRP into one program. The Board allowed for existing LPP agreements with a fixed incentive rate to convert to the sliding scale up to $250 per acre-foot, similar to GRP incentive terms. Those agreements that were converted to LRP are known as "LRP Conversions."

Competitive Local Projects Program

In 1998, the Competitive Local Resources Program was established. The competitive program encouraged development of recycled water and recovered groundwater through a process that emphasized cost-efficiency to Metropolitan, timing new production according to regional need while minimizing program administration cost. Under the competitive program, agencies requested an incentive rate up to $250 per acre-foot of production over 25 years under a Request for Proposals (RFP) for the development of up to 53,000 acre-feet per year (AFY) of new water recycling and groundwater recovery projects. In 2003, a second RFP was issued for the development of an additional 65,000 AF of new recycled water and recovered groundwater projects through the LRP.

Seawater Desalination Program

Metropolitan established the Seawater Desalination Program (SDP) in 2001 to provide financial incentives to member agencies for the development of seawater desalination projects. In 2014, seawater desalination projects became eligible for funding under the LRP and the SDP was ended.

2007 Local Resources Program

In 2006, a task force comprising member agency representatives was formed to identify and recommend program improvements to the LRP. As a result of the task force process the 2007 LRP was established with a goal of 174,000 AFY of additional local water resource development. The new program allowed for an open application process and eliminated the previous competitive process. This program offered sliding scale incentives of up to $250 per acre-foot, calculated annually based on a member agency's actual local resource project costs exceeding Metropolitan's prevailing water rate.

2014 Local Resources Program

A series of workgroup meetings with member agencies was held to identify the reasons why there was a lack of new LRP applications coming into the program. The main constraint identified by the member agencies was that the $250 per acre-foot was not providing enough of an incentive for developing new projects due to higher construction costs to meet water quality requirements and to develop the infrastructure to reach end-use consumers located further from treatment plants. As a result, in 2014, the Board authorized an increase to the maximum incentive amount, provided alternative payment structures, included onsite retrofit costs and reimbursable services as part of the LRP and added eligibility for seawater desalination projects. The current LRP incentive payment options are structured as follows:

- Option 1 – Sliding scale incentive up to $340/AF for a 25-year agreement term
- Option 2 – Sliding scale incentive up to $475/AF for a 15-year agreement term
- Option 3 – Fixed incentive up to $305/AF for a 25-year agreement term

On-site Retrofit Programs

In 2014, Metropolitan's Board also approved the On-site Retrofit Pilot Program which provided financial incentives to public or private entities toward the cost of small-scale improvements to their existing irrigation and industrial systems to allow connection to existing recycled water pipelines. The On-site Retrofit Pilot Program helped reduce recycled water retrofit costs to the end-use consumer which is a key constraint that limited recycled water LRP projects from reaching full production capacity. The program incentive was equal to the actual eligible costs of the on-site retrofit, or $975 per acre-foot of up-front cost which equates to $195 per acre-foot for an estimated five years of water savings ($195/AF x 5 years) multiplied by the average annual water use in previous three years, whichever is less. The Pilot Program lasted two years and was successful in meeting its goal of accelerating the use of recycled water.

In 2016 Metropolitan's Board authorized the On-site Retrofit Program (ORP), with an additional budget of $10 million. This program encompassed lessons learned from the Pilot Program and feedback from member agencies to make the program more streamlined and improve its efficiency. As of fiscal year 2019/20, the ORP has successfully converted 440 sites increasing the use of recycled water by 12,691 AFY.

Stormwater Pilot Programs

In 2019, Metropolitan's Board authorized both the Stormwater for Direct Use Pilot Program and a Stormwater for Recharge Pilot Program to better understand stormwater in Southern California. These pilot programs are intended to encourage the development, monitoring, and study of new and existing stormwater projects by providing financial incentives for their construction/ retrofit and monitoring/reporting costs. These pilot programs will help evaluate the potential water supply benefits delivered by stormwater capture projects and provide a basis for potential future funding approaches. Metropolitan's Board authorized a total of $12.5 million for the stormwater pilot programs ($5 million for the District Use Pilot and $7.5 million for the Recharge Pilot).

Current Status

Today, nearly one-half of the total recycled water and groundwater recovery production in the region is developed with an LRP incentive by Metropolitan. During fiscal year 2019/20, Metropolitan

provided about $13 million for production of 71,000 AF of recycled water for non-potable and indirect potable uses. Metropolitan provided about $4 million to support projects that produced about 50,000 AF of recovered groundwater for municipal use. Since 1982, Metropolitan has invested $680 million to fund 85 recycled water projects and 27 groundwater recovery projects that have produced a cumulative total of about 4 million AF.

Conservation Programs

Metropolitan's regional conservation programs and approaches have a long history. Decades ago, it was recognized that demand management would be an important part of balancing regional supplies and demands. By reducing the demand for water, water conservation efforts were seen as a way to reduce the need of imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area. The actual conservation of water takes place at the retail consumer level. Regional conservation approaches have proven to be effective at reaching retail consumers throughout the service area and successfully implementing water saving devices, programs, and practices. Regional investments in demand management programs, of which conservation is a key part along with local supply programs, benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported water supplies, decrease the burden on the district's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all system users.

Incentive-Based Conservation Programs

Conservation Credits Program

In 1988, Metropolitan's Board approved the Water Conservation Credits Program (Credits Program). The Credits Program is similar in concept to the Local Projects Program (LPP). The purpose of the Credits Program is to encourage local water agencies to implement effective water conservation projects through the use of financial incentives. The Credits Program provides financial assistance for water conservation projects that reduce demands on Metropolitan's imported water supplies and require Metropolitan's assistance to be financially feasible.

Initially, the Credits Program provided 50 percent of a member agency's program cost, up to a maximum of $75 per acre-foot of estimated water savings. The $75 Base Conservation Rate was established based Metropolitan's avoided cost of pumping SWP supplies. The Base Conservation Rate has been revisited by Metropolitan's Board and revised twice since 1988, from $75 to $154 per acre-foot in 1990 and from $154 to $195 per acre-foot in 2005.

In fiscal year 2019/20 Metropolitan processed more than 30,400 rebate applications totaling $18.9 million.

Member Agency Administered Program

Some agencies also have unique programs within their service areas that provide local rebates that may differ from Metropolitan's regional program. Metropolitan continues to support these local efforts through a member agency administered funding program that adheres to the same funding guidelines as the Credits Program. The Member Agency Administered Program allows member agencies to receive funding for local conservation efforts that supplement, but do not duplicate, the rebates offered through Metropolitan's regional rebate program.

Water Savings Incentive Program

There are numerous commercial entities and industries within Metropolitan's service area that pursue unique savings opportunities that do not fall within the general rebate programs that Metropolitan provides. In 2012, Metropolitan designed the Water Savings Incentive Program (WSIP) to target these unique commercial and industrial projects. In addition to rebates for devices, under this program, Metropolitan provides financial incentives to businesses and industries that created their own custom water efficiency projects. Qualifying custom projects can receive funding for permanent water efficiency changes that result in reduced potable demand.

Non-Incentive Conservation Programs

In addition to its incentive-based conservation programs, Metropolitan also undertakes additional efforts throughout its service area that help achieve water savings without the use of rebates. Metropolitan's non-incentive conservation efforts include:

- residential and professional water efficient landscape training classes
- water audits for large landscapes
- research, development and studies of new water saving technologies
- advertising and outreach campaigns
- community outreach and education programs
- advocacy for legislation, codes, and standards that lead to increased water savings

Current Status

Since 1990, Metropolitan has invested $824 million in conservation rebates that have resulted in a cumulative savings of 3.27 million acre-feet (MAF) of water. These investments include $450 million in turf removal and other rebates during the last drought which resulted in 175 million square feet of lawn turf removed. During fiscal year 2019/20, 1.06 MAF of water is estimated to have been conserved. This annual total includes Metropolitan's Conservation Credits Program, code-based conservation achieved through Metropolitan-sponsored legislation; building plumbing codes and ordinances; reduced consumption resulting from changes in water pricing; and pre-1990 device retrofits.

Rate Structure

Metropolitan's regional demand management programs and approaches have a long history. Decades ago, it was recognized that demand management would be an important part of balancing regional supplies and demands. Developing new local projects and increasing water conservation efforts were seen as ways to reduce the need of increased imported supplies and offset the need to transport or store additional water into or within the Metropolitan service area, reducing infrastructure costs.

The actual production and use of local resources and conservation of water under Metropolitan's demand management programs takes place at the member agency or end-user level, meaning they produce or conserve water for their own use, and the water is not Metropolitan's. Metropolitan determined decades ago that regional investments in demand management—both conservation and local resource development—benefit all member agencies regardless of project location. These programs help to increase regional water supply reliability, reduce demands for imported

water supplies, decrease the burden on Metropolitan's infrastructure and reduce system costs, and free up conveyance capacity to the benefit of all system users.

Infeasibility of Accounting

The accounting of the regional investments that contribute to reducing Metropolitan's reliance on the Delta is straightforward to calculate and report at the regional aggregate level. However, any similar accounting is infeasible at the individual member or sub-member agency level. As described above, the region (through Metropolitan) makes significant investments in resources and programs that reduce reliance on the Delta. In fact, all of Metropolitan's investments in Colorado River supplies, groundwater and surface storage, local resources development and demand management measures that reduce reliance on the Delta are collectively funded by revenues generated from the member agencies (and their subagencies) through rates and charges. The relative contributions for a member agency may be able to be approximately quantified or estimated by proxy through relative water purchases, however making an estimate of any quantifiable savings in gallons or AF is not feasible. Water purchases cannot, with any accuracy or precision, be tied to the actual projects or programs that deliver water to the collective member agencies and their subagencies. Additionally, using water purchases as a proxy for member agency and subagencies would result in projects and programs done outside of the Metropolitan incentive programs to be omitted and discounted. Accounting at the regional level allows for the incorporation of these local supplies and water use efficiency programs done by member agencies and subagencies in both the regional programs and their own specific local programs. Projects and programs each have different online dates, useful lives, production, incentive rates and contributions that cannot be matched to the demands or supply production history of an individual agency, or consistently across the agencies within Metropolitan's service area. As shown above, despite that infeasibility, Metropolitan's members and their subagencies have together made substantial contributions to the region's reduced reliance.

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2025 UWMP Appendix K

Potential Near-Term Annexations

Projected Demands for Proposed Near-term Annexations

Member Agency	Potential Annexation	Estimated Annual Demands (AFY)	
		2030	Post-2030
Carlsbad MWD	None	0	0
Del Mar, City of	None	0	0
Escondido, City of	Harvest Hills (formerly Safari Highlands)	694	694
Helix WD	None	0	0
Lakeside WD	None	0	0
Oceanside, City of	None	0	0
Olivenhain MWD	None	0	0
Otay WD	Otay Ranch Village 13	1,782	1,782
	Peaceful Valley Ranch	0	70
	Stoddard Parcel	2	2
	San Ysidro Mt. Parcel Village 17 (296 Sfd)	232	232
Padre Dam MWD	Viejas and I-8 corridor near Viejas Boundary	2,352	2,352
Poway, City of	None	0	0
Ramona MWD	Barona	860	1500
Rincon Del Diablo MWD	Homes between Del Dios Hwy and Lake Hodges	0	417
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	32
Vista ID	None	0	0
Yuima MWD	Pauma Valley Water Company	40	40
Total Potential Annexations		**6,009**	**7,136**

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2025 UWMP Appendix L

DWR Standardized Tables

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